

THE IRON AGE

A Review of the Hardware and Metal Trades.

Published every Thursday Morning by David Williams, No. 98, 100 & 102 Reade St., New York.

Vol. LII: No. 2.

New York, Thursday, July 13, 1893.

\$4.50 a Year, including Postage.
Single Copies, Ten Cents.

Reading Matter Contents.....	page 85
Classified List of Advertisers....	101
Alphabetical Index to Advertisers ..	105
Advertising and Subscription Rates ..	95

SHULTZ BELTING CO.
MANUFACTURERS OF IT BELTS THE EARTH AND MAKES THE MOON SPIN LIKE A TOP.
TANNED SURFACES ONLY. INTERIOR RAWHIDE. NONE GENUINE WITHOUT "SABLE" STAMPED EVERY TEN FEET.

Send for circular "I" to
SHULTZ BELTING CO.,
ST. LOUIS, MO.,
NEW YORK, N. Y., 225 Pearl St., A. B. Laurence, Mgr.
BOSTON, MASS., 164 Summer St., G. J. Kelley, Mgr.
PHILADELPHIA, PA., 129 N. 3d St., J. Garnett, Mgr.

TUDOR IRON WORKS,

ST. LOUIS,
Manufacturers of
Track Fastenings,
Boat Spikes,
Goldie Spikes. Mining Rails.

Every Hardware and Mill Supply Dealer
Should Sell Bristol's Patent

STEEL BELT LACING.
Send for show card, circular and free samples
READY TO APPLY FINISHED JOINT

THE BRISTOLS' MFG. CO., Waterbury, Conn.
New York Office, 121 Liberty St.

BRAIDED CORD.

Send for Samples.

Sash Cord, Bell Cord,
Clothes Lines, Masons' Lines.
SAMSON CORDAGE WORKS, Boston, Mass.

TURNBUCKLES.



BRANCH OFFICE: **Cleveland**
136 Liberty St., City Forge and Iron Co.,
NEW YORK. CLEVELAND, O.

EXTRA SOFT TOUGH STEEL



BRIDGEPORT, CONN. SEE PAGE 3.
THE WILMOT & HOBBS MFG. CO.



Manufacturers of A1. Nickel Finish Standard
Wrought Gongs Capacity 50,000 Bells per day.
Orders filled promptly from stock. Also unexcelled
18 Karat **BRONZED BELLS.** A cheap and
elegant finish. Mills and Factories, Bridgeport, Conn.
Store, 20 Murray Street, New York.

SMOKELESS PAPER SHELLS

Loaded with Nitro Powders, Schultze, E. C.,
S. S. and American Wood.

—SOLD ONLY THROUGH DEALERS—

SALMON



COLOR.

Made in 10, 12 and 16 gauge. Price-list on application.
Packed 25 in a box, 500 in a case.

MANUFACTURED BY

The Union Metallic Cartridge Co.,
BRIDGEPORT, CONN.

RANDOLPH & CLOWES,

WATERBURY, CONN.,

Manufacturers of Seamless Drawn Brass and Copper Tubing and Large Shells, Brazed
Tubes and Mouldings, Sheet Brass, Sheet Copper, German Silver.

—SOLE MANUFACTURERS OF—

Brown's Patent Seamless Drawn Copper House Boilers.

CANNOT COLLAPSE. WILL NOT LEAK.

Ordinary weight tested to 200 lbs., extra heavy to 300 lbs. pressure per square inch. Made of two Seam-
less Drawn Copper Shells. Handsomest, best and strongest and safest boiler in the market and cheapest in
the end. Send for circular and instructions to prevent accidents from freezing, &c., &c.



JENKINS BROS.' VALVES.

Every valve tested and warranted, all parts interchangeable
Nothing but best Steam Metal used in the manufacture.
Keyed Stuffing Box and Disc Removing Lock Nut
Is used only in the Jenkins Bros. Valves.
None are genuine unless stamped with "Trade-Mark."
Should you order INSIST on having Jenkins Bros.' Valves

71 John St., New York.

21 N. Fifth St., Philad'a.

31 and 33 North Canal
Street, Chicago.

105 Milk Street, Boston.

DRIPPING PANS. 40 Sizes. The best made, (Beaman's Patent Improved.)

MARYLAND ROASTER AND BAKER. { New and Effective.
Cheapest in the Market.

Made only by **MATTHAI, INGRAM & CO.,**
Factory and Main Office: **BALTIMORE, MD.** Branch: 64 Reade St., N. Y.
Leading manufacturers of Stamped and Patent Pieced Tin Ware and Galvanized
Iron Ware.

THE Avery Stamping Co.

We retin Iron, Steel and Copper. **CLEVELAND, O.**

Heavy Blanking, Pressing & Stamping.

Rainey Connellsville Furnace and Foundry Coke.

The only Coke you can buy and know you are getting the best that can be manufactured. All our works in
the heart of the Region, within four miles of Connellsville, Pa.

CAPACITY, 3,000 TONS DAILY.

W. J. RAINEY,

MAIN OFFICE:
Mercantile Bank Building.

CLEVELAND, OHIO.

Hosted by Google

THE
ANSONIA BRASS
AND **COPPER CO.**
MANUFACTURERS OF

BRASS AND COPPER

Seamless Tubes, Sheets, Rods and Wire.

Ingot Copper.

SOLE MANUFACTURERS

Tobin Bronze

(TRADE-MARK.)

Condenser Plates, Pump Linings, Wire, Round,
Square and Hexagon Bars, for Pump
Piston Rods and Bolt Forgings.

19 & 21 Cliff Street, - - New York.

JOHN DAVOL & SONS,

AGENTS FOR

Brooklyn Brass & Copper Co.,

DEALERS IN

INGOT COPPER, SPELTER, LEAD, TIN,

ANTIMONY, SOLDER & OLD METALS,

100 John Street, - - New York.

VADE MECUM.

A work of reference for the use of Architects, Architectural Iron Workers, Builders, Blacksmiths, Bookkeepers, Boiler Makers, Contractors, Civil, Mechanical, Hydraulic, Mining, Stationary, Marine and Locomotive Engineers, Foremen of Machine Shops, Firemen, Master Mechanics of Railroads, Master Car Builders, Machine Shop Proprietors, Machinery Jobbers, Machinery Salesmen, Machinists, Pattern Makers, Railway Superintendents, Railway Supply Agents, Roadmasters, Superintendents of Factories and Business Men generally.

Compiled and Arranged by

D. B. DIXON,

And with a most exhaustive Electrical Department by

THOS. G. GRIER,

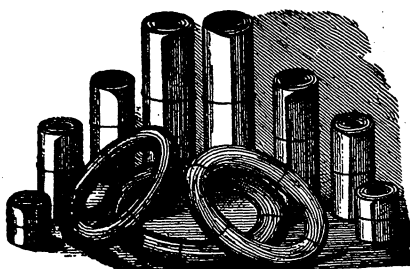
A Prominent Specialist.

480 Pages, 8¼ x 5¼ inches, Cloth, \$2.50.

Sent, post-paid, on receipt of price, by

DAVID WILLIAMS, Publisher & Bookseller,

96-102 READE ST., NEW YORK.



Waterbury Brass Co.

Established 1845.

Sheet, Roll and Platers' Brass,

German Silver, Copper, Brass and German Silver Wire, Brass and Copper Tubing,

COPPER RIVETS AND BURS

PERCUSSION CAPS,

TAPE MEASURES,

METALLIC EYELETS,

Brass Kettles, Brass Tags, Powder Flasks, Shot Pouches, &c.,

AND SMALL BRASS WARES OF EVERY DESCRIPTION.

HICK'S PRIMERS. BERDAN PRIMERS.

Cartridge Metal in Sheets or Shells a Specialty.

Sole Agents for the CAPEWELL MFG. CO.'S Line of Sporting Goods.

DEPOTS:

296 Broadway, New York. 125 Eddy St., Providence, R. I.

MILLS AT WATERBURY, CONN.

THE
New Haven Copper Co.,

SOLE MAKERS OF

POLISHED COPPER

Under Patent of T. James, Sept. 12, 1876.

ALSO MANUFACTURERS AND

DEALERS IN

BRAZIERS' & SHEATHING COPPER.

Kettles, Bottoms, Bolts, Circles, &c.,

ALSO MANUFACTURERS OF

Cast Steel Augers and Bits of Superior Quality.

294 Pearl St., NEW YORK.

MATTHIESSEN & HEGELER ZINC CO.,

LA SALLE, ILLINOIS,

SMELTERS OF SPELTER.

AND MANUFACTURERS OF

SHEET ZINC AND SULPHURIC ACID.

Special Sizes of Zinc cut to order. Rolled Battery Plates.

Selected Plates for Etchers' and Lithographers' use.

Selected Sheets for Paper and Card Makers' use.

Stove and Washboard Blanks.

ZINCS FOR LECLANCHE BATTERY.

BRASS GOODS MFG. CO.,

Mfrs. of Stamped Brass, Silver and Nickered Goods, Brass Labels for Cans and Rubber Moulds,

BRONZE DOOR KNOBS,

Bronze and Plated Roses, Combined Rose and Escutcheon Plates, Socket Shells, &c., Patent Mirror Pin Cushion Business Cards, Mucilage Brushes. Novelties of new design made to order.

SALESROOM: 88 Chambers St., New York. FACTORY: 86-92 Third St., So. Brooklyn.

HENDRICKS BROTHERS,

Proprietors of the

Belleville Copper Rolling Mills,

Manufacturers of

Braziers', Bolt and Sheathing

COPPER.

COPPER WIRE AND RIVETS.

Importers and Dealers in

Ingot Copper, Block Tin, Spelter, Lead, Antimony, etc.

49 CLIFF ST., NEW YORK.

THE PLUME & ATWOOD MFG. CO.

MANUFACTURERS OF

Sheet and Roll Brass

—AND—

WIRE,

GERMAN SILVER AND GILDING METAL,
COPPER RIVETS AND BURS, COPPER ELECTRICAL WIRE,

Pins, Brass Butt Hinges, Jack Chain,
Kerosene Burners, Lamp Trimmings, &c.

18 MURRAY ST., NEW YORK.

71 PEARL ST., BOSTON.

90 MARKET ST., CHICAGO.

ROLLING MILL,
THOMASTON, CONN.

FACTORIES:
WATERBURY, CONN.

Holmes, Booth & Haydens

MANUFACTURERS OF

Sheet, Roll Brass, Brass and German Silver Wire.

COPPER RIVETS AND BURRS

JACK CHAIN.

SEAMLESS TUBING, BRASS AND COPPER.

Brazed Brass and Copper Tubing,
Bare and Insulated Wire for Electric Lighting and Street Railway Use, Lamp Goods and Kerosene Burners in great variety.

FACTORIES: 25 Park Place,
Waterbury, Conn. New York.

SCOVILL MFG. COMPANY,

Manufacturers of

BRASS

Sheet, Wire, Tubes.

**BUTT HINGES,
BUTTONS,
LAMP GOODS,
NOVELTIES.**

PURE ALUMINUM

INGOT and SHEETS.

FACTORIES, WATERBURY, CONN.

DEPOTS:

428 Broome Street, New York. 210 Lake Street, Chicago. 29 High Street, Boston.

WILLIAM S. FEARING.

100 Chambers St., NEW YORK,

SELLS TO THE TRADE

Sheet Brass, Fancy Sheet Brass,
German Silver, Copper, Brass
and German Silver Wire,
Brazed and Seamless Brass and
Copper Tubes, Brass and Copper
Rods, Brass Ferrules,
Pure Copper Wire,
Sheet and Ingot Copper, Spelter,
Tin, Antimony, Lead, &c.

Rough Casting of Aluminum.

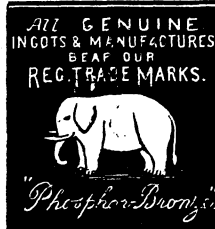
Aluminum Bronze, German Silver Bronze and all kinds of Metals. Manufacturers of Chandeliers, Metal Picture Frames, Ink Stands, Figures, Statues, etc. Stair Carpet Holders a Specialty.

St. Louis Bronze & Aluminum Works,

3741-3743 North Broadway,

ST. LOUIS, MO.

**ELEPHANT
TRADE-MARK.**



PHOSPHOR-BRONZE
INGOTS, CASTINGS, WIRE, SHEET &C.
THE PHOSPHOR BRONZE SMELTING CO. LIMITED
512 ARCH ST. PHILADELPHIA PA. U.S.A.
ORIGINAL MANUFACTURERS OF PHOSPHOR-BRONZE IN THE UNITED STATES AND SOLE MAKERS OF "ELEPHANT BRAND" PHOSPHOR-BRONZE.

**PHOSPHOR
BRONZE.**

The Wm. Cramp & Sons S. & E. B. Co., PHILADELPHIA, PENNA.

BRASS FOUNDERS.

YORK AND THOMPSON STS.,
SOLE MANUFACTURERS OF

AMERICAN MANGANESE BRONZE.



MANGANESE BRONZE PROPELLER WHEELS A SPECIALTY.

Our Manganese Bronze is invaluable where Castings of great Tensile Strength are needed. In this quality it is nearer Steel than any other alloy in the market, and in appearance the castings are unequaled.

We Make Larger Castings and More of Them than Any Competitor.

THE CELEBRATED ACID RESISTING DEOXIDIZED BRONZE IN INGOTS OR CASTINGS, AND DEOXIDIZED BABBITT METALS.

BEST IN THE WORLD.

Large Castings a Specialty.

Bridgeport Deoxidized Bronze and Metal Co.,
BRIDGEPORT, CONN.

**BRASS, BRONZE,
COMPOSITION and
ALUMINUM**

F. L. GAYLORD CO.

Send

for

Prices.

CASTINGS, Heavy and Light.

ANSONIA,
CONN.

**GENUINE
PHOSPHOR TIN,**

MANUFACTURED BY THE

**CROSBY STEAM GAUGE
AND VALVE CO.**

Boston, Mass., U. S. A.

Branches: NEW YORK, CHICAGO AND LONDON.

PASSAIC ART CASTING CO.

PASSAIC, N.J.
New York Office
35 WARREN ST.

Fine Castings by new pressure process, equal to hand cut work, in Bronze, Brass, Aluminum and German Silver. Machinery Name Plates 1 1/2 cents per sq. in. Aluminum Bronze Dies, Metal Molds and Mechanical Castings absolutely true to pattern.

**THE CRESCENT TRY IT!
AND YOU WILL USE NO OTHER**
**THE CRESCENT BRAND
PHOSPHOR
TIN.**
THE HIGHEST AND
RICHEST GRADE MADE.
MANUFACTURED ONLY BY
THE CRESCENT PHOSPHORIZED METAL CO.
OFFICE AND WORKS
2107 2109 and 2111 INDIANA AV. PHILADELPHIA, PA.

CROWN SMELTING COMPANY,

Chester, Pa.

Bronze, Brass and Composition Castings.

Inventors and Sole Manufacturers of

"Crown Bronze" Bearing Metal and "Crown ROLLING MILL Babbitt Metal."

Manufacturers of **PHOSPHOR-BRONZE TO PENNSYLVANIA RAILROAD.**

Specifications in ingot metal or castings.

THE WILMOT & HOBBS MFG. COMPANY

Especially solicit orders for "Soft" and "Extra Soft" Plain Blue Finish or Annealed or Pickled

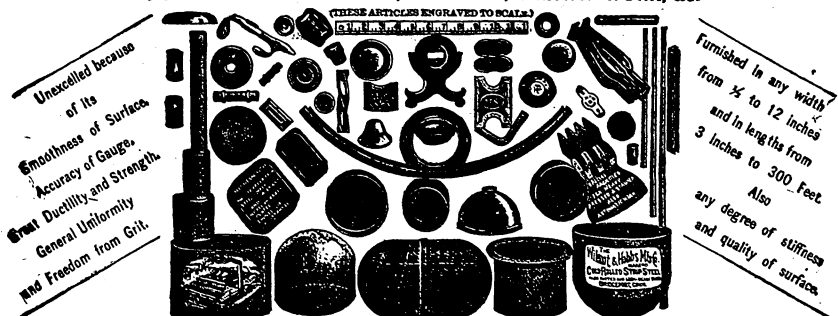
**HOT ROLLED BAND, STRIP
AND PLATE STEEL.**

Great accuracy of gauge and width and uniformity of quality will always be maintained.

Also THE CELEBRATED BRIGHT SURFACE and ANNEALED

COLD ROLLED SHEET AND STRIP STEEL

FOR DIFFICULT PRESSED, STAMPED, DRAWN WORK, &C.



The above illustrates something of the variety of Stamped and Drawn Work which can be made from this Steel.

PRICES GREATLY REDUCED On some Grades and Sizes of C. R. Steel when Bought in Large Quantities of a Size.

When in a hurry use Long Distance Telephone.
24 hours' ride from Grand Central Depot, N. Y. City, via N. Y., N. H. & N. E. R.

BRIDGEPORT, CONN.

A

PHOSPHOR-TIN

BY USING MY PHOSPHOR TIN MANUFACTURERS CAN MAKE ANY DESIRED GRADE OF PHOSPHOR BRONZE THEMSELVES. BY THE SIMPLE PROCESS OF MELTING. MUCH CHEAPER THAN THEY ARE NOW TO BE HAD IN THE MARKET. NEW OR OLD COPPER CAN BE USED. FOR CIRCULARS AND PRICE ADDRESS **HALK & NAUMANN** NEW-YORK OFFICE SOLE AGENTS FOR THE U.S. AND CANADA & PEARL

WIRE

NAILS.

INDIANA WIRE FENCE CO.,

Crawfordsville, Ind.

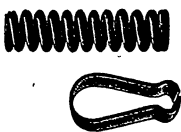
WASHBURN & MOEN MANUFACTURING CO.,

WORKS IN WORCESTER, MASS., and WAUKEGAN, ILL.

MAKERS OF IRON, STEEL AND COPPER

EVERY VARIETY OF **W I R E** FOR ALL PURPOSES.

FINE OIL TEMPERED SPRINGS A SPECIALTY.

SPIRAL FURNITURE,
BED AND
SPECIAL
SPRINGS.**FLAT**CLOCK
and
WATCH
SPRINGS.

EXPORT ORDERS PROMPTLY FILLED.

Warehouses: 16 Cliff and 241 Pearl Sts., New York; 107 & 109 Lake St., Chicago; 8 & 10 Pine St., San Francisco.

**The American Metal Co.**

(LIMITED),

Levin Building, 80 Wall St., New York.

P. O. BOX 957.

COPPER, COPPER ORES AND MATTES.

TIN, LEAD, SPELTER, ANTIMONY, NICKEL,
ALUMINIUM, BULLION, IRON.

Advances made on Consignments.

AGENTS FOR

Henry R. Merton & Co., - - London.
Metallgesellschaft, - - Frankfurt-on-Main.
Williams, Foster & Co., Ltd., - - Swansea.**AMERICAN SPIRAL SPRING CO.,**

MANUFACTURERS OF

ALL KINDS OF SPIRAL SPRINGS.

OFFICE AND WORKS:

Shingles and Bluff Streets, - - PITTSBURGH, PA

TELEPHONE 705.

WM. MCFARLAND,
IRON FOUNDER,

TRENTON, - - N. J

Chilled Cast Wire DIES

A SPECIALTY.

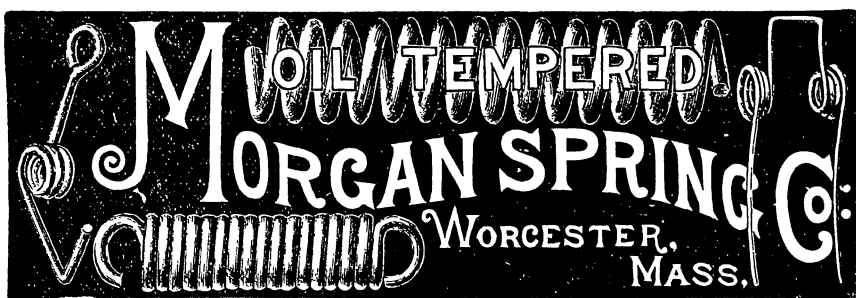
Any Size or Style Made at Short Notice.



Guaranteed.

Best Anti-Friction Metal for all machinery bearings.
For high speed and heavy crushing weight it has no
equal. Introduced in this country since 1891 and has
displaced all Anti-Friction metals it has come in con-
tact with.

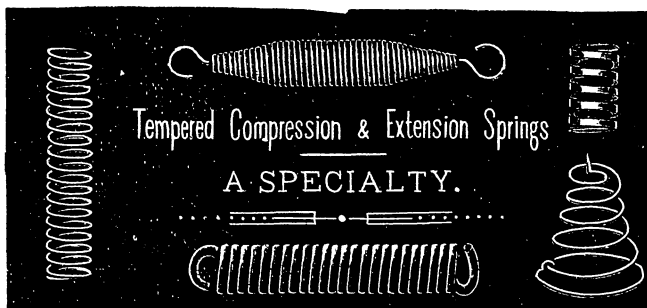
THEODORE HIERTZ & SON, SOLE MFRS..

Manufacturers Babbitt Metals, Solder, Lead, Seals, &c.
20th St. & Park Ave., St. Louis, Mo.**MILLER & VAN WINKLE,**

MANUFACTURERS OF

STEEL WIRE AND STEEL SPRINGS.

TEMPERED STEEL WIRE.



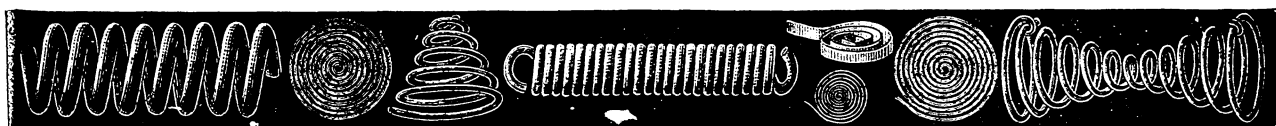
MACHINERY SPRINGS.

OFFICE AND WORKS: }
18 to 24 Bridge-Street, } BROOKLYN, N. Y.VOLUTE,
WIRE
and
FLAT STEEL**SPRINGS**& Agricultural Implements, Machin-
ery and various other purposes.
Write for prices to**SABIN MACHINE CO.,**
MANUFACTURERS.
MONTPELIER, VT



117th to 118th Street and Harlem River.

General Offices, Foot 118th Street, New York.



Makers of Iron, Bessemer, Siemens-Martin and Crucible Cast Steel Wire of all kinds, annealed, soft and hard drawn; Coppered Spring Wire for Furniture Springs, &c., Coppered Soft Wires, Baling Wires, Suspension Bridge and Rope Wires of all kinds, &c.

STEEL MUSIC WIRES and MUSIC SPRING WIRES,

UNRIVALED FOR PIANOFORTE STRINGS.

FOR THE HIGHEST CLASS OF SPRINGS.

Specialty of finest Cast Steel Wires, round, flat, square and any other shape, tempered and also in the soft state, guaranteed to harden and temper. Solid Rib and Paragon Umbrella Wires. Crinoline, Corset, Shade Roller, Lock, Hat, Brush, Saw, Band Saw, Clock Spring, Clock Bell, Clock Verge and Watch Spring, Rule and Tape Line and Eyeglass Wires, &c. Piano, Needle, Fish Hook, Drill and Hair Spring Wires. Special Cast Steel Wires of any kind made for special purposes. Also Covered Wires—Braided and Cloth and Paper Covered—for crinoline, corset and other purposes. Cold Rolled and Slit soft and Tempered Steel Strips of all kinds and for all purposes.

Special Wires and Springs of Every Description.

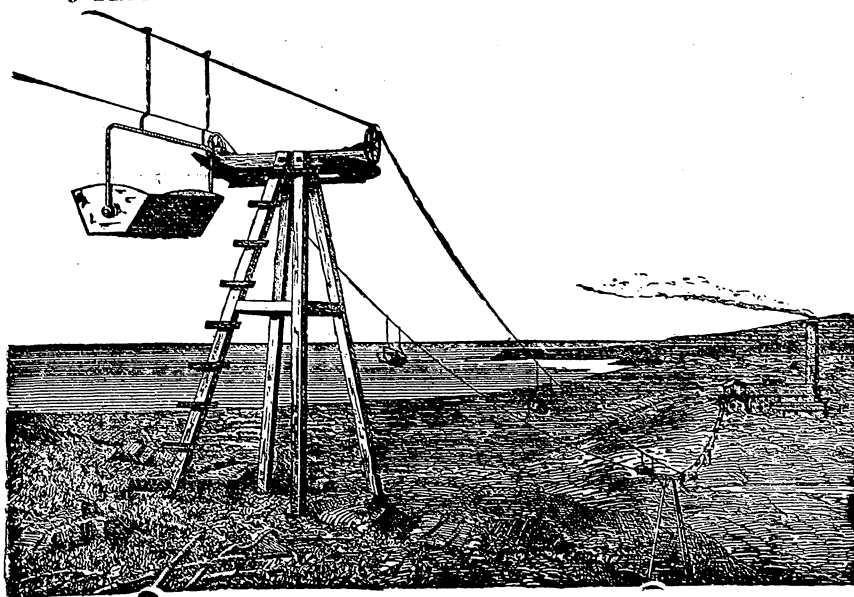
CORRESPONDENCE SOLICITED.

SAMPLES FURNISHED ON APPLICATION.

CALIFORNIA WIRE WORKS,

9 FREMONT STREET.

SAN FRANCISCO, CAL.



MANUFACTURERS OF

WIRE ROPE FOR CABLE RAILWAYS AND MINING PURPOSES.

HALLIDIE'S PATENT WIRE ROPEWAY,

Simplest and most economical means of transportation.

Send for illustrated Catalogue.

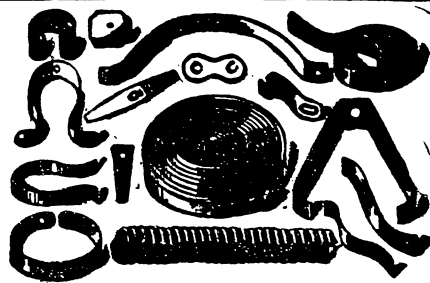
THE CELEBRATED

"SILVER FINISH"

GALVANIZED POULTRY NETTINGS.

FOR SALE BY THE HARDWARE TRADE.

GET THE BEST.



DUNBAR BROS.,

Manufacturers of

Clock Springs and Small Springs

of every description, from best Cast Steel,

BRISTOL, CONN.

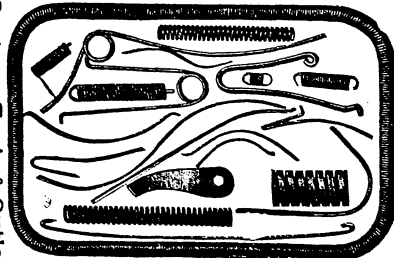
FRED NOURSE CO.,



STEEL WIRE AND STEEL SPRINGS,

315, 317 and 319 East 22d St., New York.

TUCK M'F'G CO., Brockton Mass,



Springs, Tools & Cutlery

Send for Catalogue.

Tempered Springs of all kinds.

**Always
Ask
For**



**Unequaled for Strength
and Durability.**

Made Only by

**Broderick & Bascom Rope Co.,
St. Louis, Mo.**

**HOWSON
AND
HOWSON**

**Counsellors at Law
Solicitors of Patents**

PHILADELPHIA
Forrest Building, 119 S. 4th St.
NEW YORK
Potter Building, 38 Park Row.
WASHINGTON
Atlantic Building, 928 F St.

PATENTS

U. S. and Foreign Secured.

**Trade Marks and Copy Rights. Twenty
Years' Experience.** Send model or sketch
and brief description of your invention for
Free report as to patentability. Expert
searches and opinions as to Scope, Valid-
ity and Infringement. Patent Causes
Prosecuted and Defended. Practice in
U. S. Supreme, Circuit and Circuit Ap-
peals Courts, and U. S. Patent Office.

Send for "Plain Words about Patents," Free.

PATENT PRACTICE EXCLUSIVELY.

References Furnished on Application.

E. B. STOCKING, Attorney at Law,
611 F ST., N. W., WASHINGTON, D. C.

PATENTS

\$40,000,000

Earned by Bell Telephone Patent in 1891. Pro-
tect your invention by **PATENT**. No charge
for examination to determine patentability.
Send model and description. **NEW BOOK FREE.**
S. C. FITZGERALD, Washington, D. C.

PATENTS.

**H. W. T. JENNER, Patent Attorney and Me-
chanical Expert.** 519 Seventh St., Washington,
D.C. Charges moderate. Write for terms.
Established 1883.

F. H. ARNOLD,

Designer

ARTISTIC METAL WORK,
New Britain, Conn.

SPRINGS—RIVETS.

Specialties in

**SHEET METAL WORK,
CLOCK and INDICATOR POINTERS,**
CLARK & COWLES, Plainville, Ct.

PHILLIPS, TOWNSEND & CO.,
North Penn Junction, Philadelphia.

**WIRE NAILS, - - -
- - NORWAY RIVETS.**

Rivets marked "P" are not of our
make. We make only **first-class NORWAY**
IRON RIVETS.

A. LESCHEN & SONS' ROPE CO.,

MANUFACTURERS OF

Trade-Mark



Registered.

ST. LOUIS, MO.

CORRESPONDENCE INVITED



Williamsport Wire Rope Co., Williamsport, Pa.



WAREHOUSES: 87 Liberty St., New York.

WORKS

Wilkesbarre, Pa.

"EVERYTHING IN WIRE."

Not only the standard line of wire hardware contained in our
Catalogue (the largest in the country);

BUT 1001

Special articles manufactured to order.

THE WIRE GOODS COMPANY, Worcester, Mass.

NEW HAVEN WIRE MFG. CO.,

Manufacturers of **WIRE** in great variety.

NEW HAVEN,

CONN.

Wire Cloth AND Wire Goods

Hardware Grade and
Fanning Mill Wire Cloth,
Poultry Netting, Heavy
Window Screen Wire
Cloth, Coal and Sand
Screens, Riddles, Ash
Sieves, &c., &c.



Office and Counter
Railings, Elevator En-
losures, Wire Stall
Guards, Hay Racks
Feed Boxes, Window
Guards, &c., &c.

BUFFALO, N. Y.

**Catalogue
of Books,**

Including the principal works on Metallurgy,
Mineralogy, Engineering, Electricity, Mechanics,
&c., sent free to any address by

DAVID WILLIAMS, Publisher,

96-102 Reade Street, NEW YORK

HOWARD & MORSE
45 FULTON ST.
NEW YORK.
HEAVY MINING
COPPER,
BRASS,
STEEL
OR IRON
WIRE CLOTH.

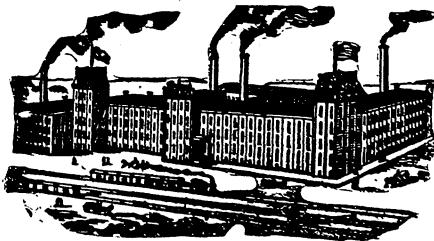
ALSO
 MANUFACTURERS OF
GENERAL
WIRE WORK.
 Window Guards,
 Stable Fixtures,
 RAILINGS,
 Sand Screens
 Coal Screens
 Etc.

Metal Work
 For Interior
 And Exterior
 Decoration
 Send For
 Catalogue. A Specialty.

Lydlow-Saylor Wire Co St Louis.

WICKWIRE BROTHERS, CORTLAND, N. Y.
 Wire Cloth and Wire Goods,

MANUFACTURERS OF



Coal Sieves,
 Flour Sieves,
 Corn Poppers,
 Dish Covers,
 Metallic
 Coal Sieves.

NEW PROCESS
Cortland
POWER LOOM
WIRE CLOTH.

Every roll wrapped in Pink Paper
 and has our name on label.

The Leading Authority on
 Business Law.

PARSONS'
THE LAWS
OF BUSINESS,

For all the States and Territories of
 the Union.

By Theophilus Parsons, LL.D.

864 pages, 6 x 9 inches: full leather\$4.50

This is a work almost indispen-
 sable to every business man, as a
 guide in transactions which are
 occurring constantly.

It constitutes a library of law on
 daily business affairs and is used
 for constant reference by many of
 the leading concerns throughout
 the country.

The volume treats fully and
 clearly of contracts, sales, agency,
 agreements and assessments, stop-
 page and transitu, considerations,
 limitations, notes and bills of ex-
 change, interest and usury. Em-
 braces chapters on commercial
 law in general, bonds, assignments,
 guaranty, the statute of frauds,
 receipts and releases, payment,
 partnership, arbitration, carriage
 of goods and passengers by rail-
 road and other carriers, hotel
 keepers, patents, copyrights, stat-
 ute of limitations, the law of place,
 shipping, marine, fire and life in-
 surance, deeds of land, mortgages
 of land, mortgages of personal
 property, leases, liens of mechan-
 ics and material men, the recovery
 of debts, wills, executors and ad-
 ministrators, guardians, and the
 legal rights of farmers, &c. Also
 abstracts of the laws of all the
 States and Territories relating to
 the collection of debts, usury, the
 execution and acknowledgment
 of deeds, witness required to wills,
 holidays and days of grace, me-
 chanics' liens, chattel mortgages,
 and nearly 300 approved forms
 which have been tested in courts.

Sent prepaid on receipt of price by

DAVID WILLIAMS,

Publisher and Bookseller

96-102 READE ST., NEW YORK

KILMER MFG. CO.,

NEWBURGH, N. Y.,

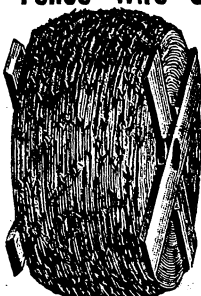
MANUFACTURERS OF

STEEL WIRE RODS,
BALE TIES, BARB WIRE.

BEST QUALITY

Fence Wire Staples, Galvanized Wire Ornamental
 Fencing,

Cable Wire, Grape Wire, Hop Yard
 Wire, Coiled Steel Wire,
 Fence Wire, &c.

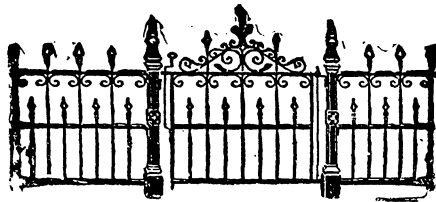


Our New Empire Bale Tie.

BRANCH HOUSE: 543-545 State Street, Chicago, Ill.

Address all export communications to

W D. MEIGHAN, 111 Water Street, New York City.

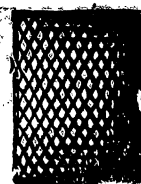


Reliance Wire & Iron Works, MILWAUKEE, WIS.

ARCHITECTURAL WIRE AND IRON WORKERS.

Wire Cloth, Galvanized Fencing and Netting, Wire Lath, Wire and Iron Fences and Railings, Window Guards, Stable Fixtures, Bank and Office Railings, all kinds of Brass, Wire and Iron Work for Buildings and Offices.

SEND FOR ILLUSTRATED CATALOGUE.



CLINTON WIRE CLOTH CO.,

— Manufacturers of Every Description of —

WIRE CLOTH, HEX. NETTINGS, WIRE LATH AND FENCING.

Perforated Metals. GALVANIZERS AND TINNERS OF **Wire Cloth and Nettings.**

Clinton "Standard" (Number 33 Wire) Painted Window Screen Wire Cloth.

FACTORY AND GENERAL OFFICE: CLINTON, MASS.

NEW YORK, 76 Beekman Street.

BOSTON, 199 Washington Street.

CHICAGO, 137 Lake Street

The Gilbert & Bennett Mfg. Co.

— MANUFACTURE —

WIRE CLOTH, NETTING,
Fencing, Gates, Fencing Tools,
Wire Goods, Wire Work

RAILINGS, WINDOW GUARDS.
WIRE LATHING WITH HAMMOND'S METAL FURRING.

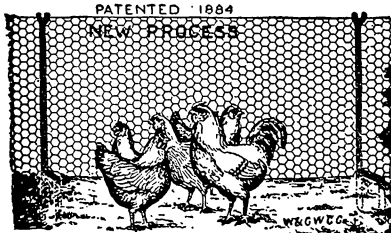
44 Cliff Street,
NEW YORK.

148 Lake Street,
CHICAGO.

Factories, { GEORGETOWN, CONN.
CHICAGO, ILLINOIS.
ESTABLISHED 1818.

Pearl Window Screen Wire Cloth.
Galvanized Steel Wire Cloth.
Galvanized Wire Poultry Netting.
"Cottage" Lawn & Garden Fencing.
The World's Web Wire Fencing.
Sieves, Riddles, Screens.
Gilbert's Rival Ash Sifters.
House Furnishing Wire Goods.

WRIGHT & COLTON WIRE CLOTH CO., Worcester, Mass.



HARD STEEL WIRE

NEW PROCESS MANUFACTURERS OF EVERY DESCRIPTION OF
HARD STEEL WIRE CLOTH AND NETTING
GALVANIZED

WIRE NETTING. Painted Window Screen Wire Cloth,
WIRE LATHING, HOUSE FURNISHING WIRE GOODS

Patented March, 1884.
Patents Pending.

SEND FOR LATEST CATALOGUE.

Pennsylvania Wire Works, 233 & 235 Arch St., Philadelphia, EDWARD DARBY & SONS.

SUMMER	:-	:-	We R the People.	:-	:-	GOODS
ADJUSTABLE WINDOW SCREENS,			"PENNSYLVANIA"			SCREEN DOORS
PENNSYLVANIA,"			GALVANIZED POULTRY NETTING,			"DARBY" and "SPECIAL"
"STANDARD,"			"CORTLAND"			—ALSO—
"EXCELSIOR,"			WINDOW SCREEN			Door - and - Window - Sticks
"ELECTRIC,"			WIRE CLOTH.			—AND—
"ROBERTS."						CORNER BRACKETS.

SPRING HINGES—DOOR PULLS. Write for Prices.

PAINTED AND GALVANIZED WINDOW SCREEN CLOTH.

IRON, STEEL, BRASS AND COPPER WIRE CLOTH

MANUFACTURERS

**THE ROEBLING
STANDARD
WIRE
LATHING.**

**• NEW JERSEY •
WIRE CLOTH CO.**

**"JERSEY"
POULTRY
NETTING
AND FARM
FENCING.**

TRENTON,
NEW JERSEY.

117 AND 119 LIBERTY STREET,
NEW YORK.

171 AND 173 LAKE STREET
CHICAGO.

25 AND 27 FREMONT STREET
SAN FRANCISCO.

FOUNDERS P. P. EMORY MFG. CO.
 —: ESTABLISHED 1850. :—
SPRINGFIELD, MASS.
Good Work, Fair Prices.
 CORRESPONDENCE SOLICITED.

COPPERSMITHS,
 and Manufacturers of
COPPER AIR CHAMBERS,
EXPANSION PIPES' AND COILS.



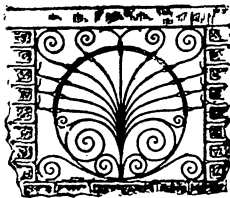
RESERVOIR VASES.

Lawn Furniture, Statuary, Office and Counter Railing, Wire Signs, Guards, Cresting, Columns, Iron Stairs, Balcony Railing, Stable Fixtures, Jail Cells, etc.

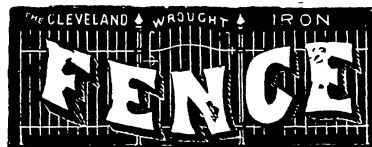
CATALOGUE FREE.

E. T. BARNUM, - DETROIT, MICH.

MENTION THIS PAPER.



THE VAN DORN IRON WORKS CO., Cleveland, Ohio.



Office and Salesroom, 157 1/2 Euclid Ave.,
 MANUFACTURERS OF
WROUGHT IRON FENCE and RAILING.
 Stable Fixtures, Crestings, Terminals, Wire Office and Counter Railing, Lawn Seats and Vases.
Iron and Steel Jail Cell Work. Ornamental and Structural Ironwork.

HUMANE, STRONG,
 CHEAPER
 THAN BARB WIRE
VISIBLE ORNAMENTAL.

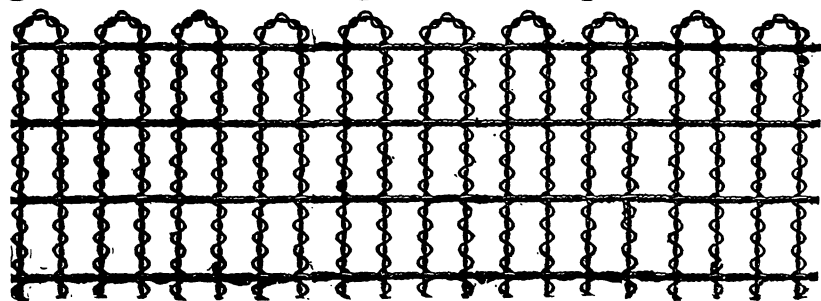
DOUBLE THE STRENGTH of any other fence; will not stretch, sag, or get out of shape. A Perfect Farm Fence, yet Handsome enough to Ornament a Lawn. Write for prices.

HARTMAN MFG. CO.,
 BEAVER FALLS, PA.

BRANCHES: 102 Chambers St., New York.
 508 State St., Chicago.
 51-53 S. Forsyth St., Atlanta, Ga.



STEEL WEB PICKET FENCING.



MOST POPULAR FOR YARDS, LAWNS, PARKS, ETC.

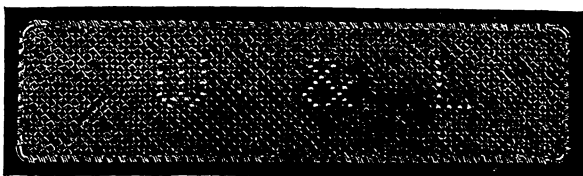
Write for Circular of above, and Steel Wire Fence Board.

DEKALB FENCE CO., - - DeKalb, Ill.

AGENCIES: Eastern—HICKS & DIOKEY, Philadelphia, Pa. Southern—W. R. BELKNAP & CO., Louisville, Ky. Western—WYETH HARDWARE & MFG. CO., St. Joseph, Mo. Indiana and Michigan—INDIANA WIRE FENCE CO., Crawfordsville, Ind. Texas—G. K. MERIWETHER, Dallas.

THE BEST WIRE MAT ON EARTH

Strongest,
 Handsomest,
 Flexible,
 Cheapest.

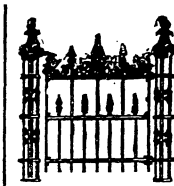


Will not wear out of shape or corners turn up.

W. & L. FLEXIBLE.

Wear longer than any wire mat made. Write for discounts.

WHITE MFG. CO., Minneapolis, Minn.



CHAMPION IRON CO.

SPECIALTIES.—Iron Stairs and Jail Work, Builders' and Ornamental Iron Work, and the only manufacturers of Malleable Iron Cresting guaranteed against breakage; also manufacturers of the Celebrated Ohio Champion Iron Force and Lift Pumps. Send for 220-page Catalogue

Largest Iron Fence and Railing Works in U. S.

KENTON, O.



W. S. ESTEY,

No. 65 FULTON ST., NEW YORK,

MANUFACTURER OF

WIRE CLOTH

Of Brass, Copper, Iron, Galvanized and Steel Wire of all meshes and grades. For Mining, Milling and all other purposes. Locomotive Spark Wire Cloth, &c.,

—AND—

WIRE WORK

For Bani, Office and Counter Railing, Store Fronts Window Guards, &c.

Galvanized Twist Netting.

Oliver's Patent Decoy Rat Traps.

S T Pat. Adjustable Foundry Riddles.

S T Sand Screens.

SEND FOR CATALOGUE.



Buckeye Wrought Iron Punched Rail Fence.

Also manufacturers of Iron Cresting, Iron Turbine and Buckeye Wind Engines, Buckeye Force Pumps, Buckeye, Globe and Champion Lawn Mowers. Send for Illustrated Catalogue and Prices to

MAST, FOOS & CO. SPRINGFIELD, O.

COBB & DREW,

PLYMOUTH, MASS.

Manufacturers of Norway Iron Rivets, Brass and Copper Rivets, Burrs, Washers, D. P. Tacks and Staples.

New York Agency, James S. Henderson, successor to Disosway & Henderson, Hardware.

Agents for Philadelphia Star Carriage and Tire Bolts.

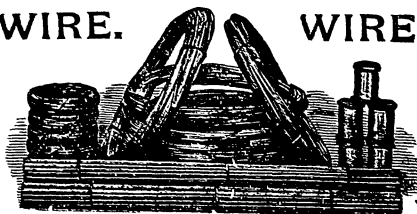
GEO. W. PRENTISS & CO.

HOLYOKE, MASS..

—MANUFACTURERS OF—

WIRE.

WIRE.



Bright, Coppered, Annealed and Tin Plated.

Finished to order, round, square, oval or flat.

TINNED WIRE OF ALL SIZES A SPECIALTY

The Berlin Iron Bridge Co.,

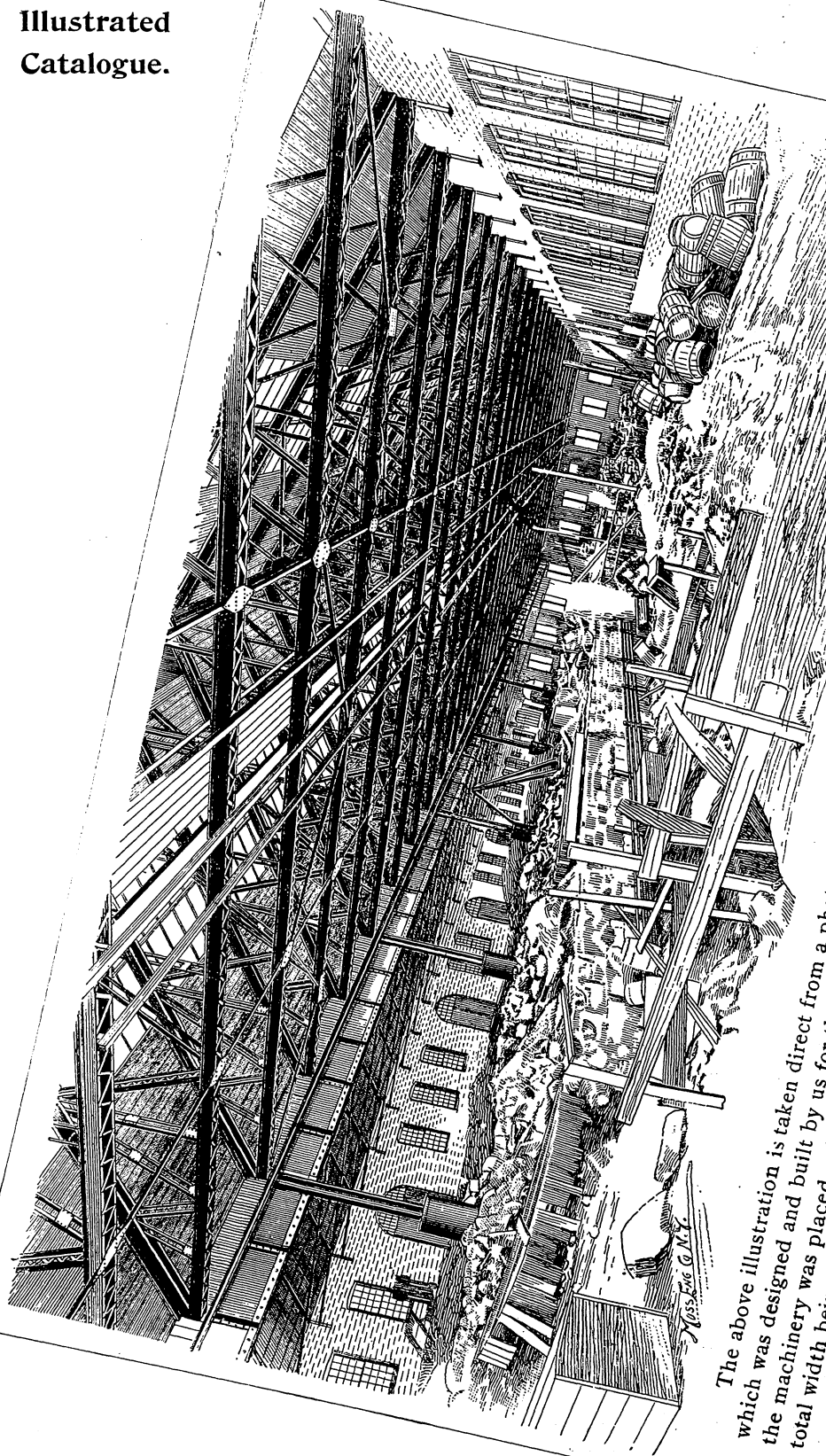
Engineers, Architects and Builders in Iron and Steel.

Office and Works, No. 5 Railroad Avenue,

EAST BERLIN,

CONN.

Send for
Illustrated
Catalogue.



The above illustration is taken direct from a photograph and shows the construction of a Rolling Mill, the roof of which was designed and built by us for the Waterbury Brass Co., at Waterbury, Conn. The photograph was taken before the machinery was placed. The Rolling Mill is 73 ft. in width and the adjacent Muffle Room is 77 ft. in width, the total width being 150 ft. and the length 350 ft.

CHAS. M. JARVIS,
Pres. and Chief Engineer

BURR K. FIELD,
Vice-President.

GEO. H. SAGE,
Secretary.

F. L. WILCOX,
Treasurer.

STEEL, IRON, COPPER, ZINC, BRASS AND TIN PERFORATED.

-FOR-

Grain Cleaning Machinery;
Woolen, Cotton, Paper Pulp, Rice,
Flour and Oil Mills;
Distilleries, Sugar and Malt Houses;
Gas, Water, Brick and Tile Works, Filters, Ventilators, &c;
Oil, Gas and Vapor Stoves, Lanterns, Lamps, etc.

Perforated Filter Press Plates

For Paraffine Wax, Cotton-Seed Oil, Sugar and other purposes.



THE HARRINGTON & KING PERF. CO.,
Main Office & Works, 224 to 240 Union Street,
Eastern office, No 284 Pearl St., New York. **CHICAGO, ILL., U. S. A.**

Screen Plates for Coal, Coke, and Ore Separators, Jigs, Trommels, Washers and Sizers.

Heavy Steel and Iron Plates and Cylinders for Coal and Coke Breakers, Ore, Stone, Phosphates & Gravel Screens.

For Railroads, Locomotive and Car Builders.

Prices and Samples on Application.

ALUMINUM or MANGANESE BRONZE
SCREEN PLATES
TO WITHSTAND ACTION OF ACIDULATED WATERS
WITH
Hardness and Life of Best Steel.

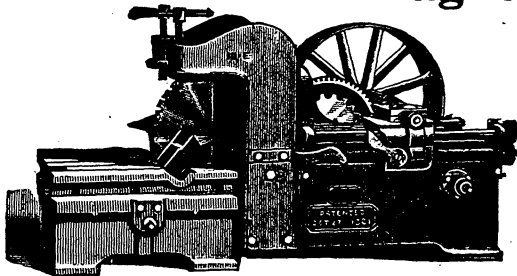
Bryant No. 10 Cold Sawing Machine.

Saves

Time,
Power,
Temper,
Labor.

Gives

True,
Clean,
Rapid
Work.



Cuts

Noiselessly,
Keenly,
Easily,
Inexpensively.

For

General
Bridge and
Railway
Work.

SEND FOR CATALOGUE.

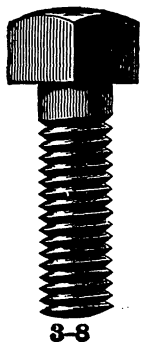
THE Q & C COMPANY, 702-707 Phoenix Bldg., - CHICAGO, ILL.

REYNOLDS & CO.

MANUFACTURERS OF

SET, CAP AND MACHINE SCREWS,

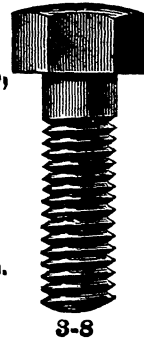
STUDS, COUPLING BOLTS, STOVE BOLTS, FINISHED NUTS, &c.



3-8



5-18



3-8

Also Hand and Draw-Plate Moulding Machines for Foundry Use.

NEW HAVEN, CONN.

Send for Catalogue.

SECURITY WAREHOUSE, EAST ST. LOUIS, ILL.,

Do a general storage business. Rates reasonable. Insurance low.

Located on B. & O. and Pennsylvania Lines.

Direct connection with 26 Railroads entering St. Louis or East St. Louis, and all Ohio, Missouri and Mississippi River Lines.

St. Louis Rates of freight to all points West of Mississippi River. To points East less. In addition to storage we do a general distributing business on commission. We have representatives traveling all over the West and South.

Correspond with us.

BOOKS

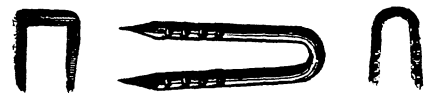
THE NEWEST BOOKS ON Iron, Steel and Metallurgy Mining, Mechanical and Civil Engineering; Casting and Founding; Electricity and Electric Lighting, promptly supplied on receipt of price by
DAVID WILLIAMS, 96-102 Reade St., New York.

E. H. TITCHENER & CO.

(Late Bing, Wire Goods Co.)

BINGHAMTON, N. Y., U. S. A.

—MANUFACTURERS OF—



STAPLES in All Varieties,
Double-Pointed Tacks, Etc.
Blind Staples a Specialty.

OXFORD IRON AND NAIL CO., Cut Nails AND SPIKES.

J. S. SCRANTON, Sales Agent,
81, 83 and 85 Washington Street,
NEW YORK.

Established 1830.

THE PLYMOUTH MILLS.

Rivets, Trunk Nails,
Tacks Clout Nails,
Burr, Wire Nails.
PLYMOUTH, MASS.

BORDEN & LOVELL,

70 AND 71 WEST STREET
NEW YORK.

Steel, Iron and Wire Nails.

Corrugated, Crimped and Clap-Board Iron Roofing & Siding



Iron Buildings, Roofs, Doors, Shutters, Cornices,
Skylights, Bridges, &c.

MOSELEY IRON BRIDGE AND ROOF CO.,
Office, 5 Day Street, Room 13, NEW YORK.

ATLAS TACK CORPORATION.**508 SEARS BUILDING, BOSTON, MASS., U. S. A.**

BRANCHES: { **DUNBAR, HOBART & CO., WHITMAN, MASS.**
ESTABLISHED IN 1810.
A. FIELD & SONS, TAUNTON, MASS.
ESTABLISHED IN 1827.
AMERICAN TACK CO., FAIRHAVEN, MASS.
ESTABLISHED IN 1867.

LORING & PARKS, PLYMOUTH, MASS.

ESTABLISHED IN 1842.

TAUNTON TACK CO., TAUNTON, MASS.

ESTABLISHED IN 1854.

OLD COLONY RIVET CO., PLYMOUTH, MASS.

ESTABLISHED IN 1866.

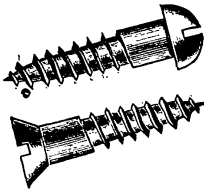
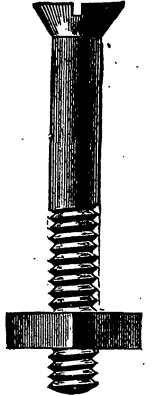
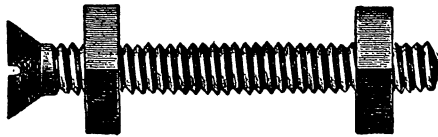
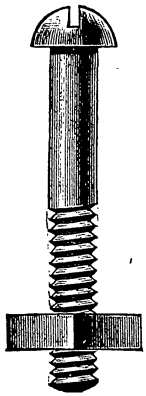
MANUFACTURERS OF

Tacks, Brads, Small Nails, Shoe Nails, Lining and Saddle Nails, Tufting Nails and Buttons, Wire Nails, Finishing Nails, Patent Brads, Hungarian Nails, Steel Shanks for Boots and Shoes, Wire Tacks, Escutcheon Pins, Eyelets, Glaziers' Points, Rivets, Burrs, Furniture Springs, Pilgrim Spring Bed, and other articles.

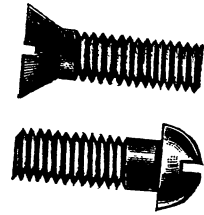
We have the largest and only complete and fully assorted stock in the world. Our manufacturing facilities are unequalled. The foregoing well known brands we continue to use, and either will be furnished upon request. We have long distance telephone connection with our New York store and our factories.

MAIN OFFICE, 508 SEARS BUILDING, 199 WASHINGTON ST., BOSTON, MASS.**BRANCH OFFICE & WAREHOUSE, 116 CHAMBERS ST., NEW YORK.****BRANCH OFFICE & WAREHOUSE, 239 & 241 LAKE ST., CHICAGO, ILL.****BRANCH OFFICE & WAREHOUSE, 408 MARKET ST., SAN FRANCISCO, CAL.****BRANCH OFFICE & WAREHOUSE, 406 COMMERCE ST., PHILADELPHIA, PA.****THE NATIONAL SCREW AND TACK CO.,**

—MANUFACTURERS OF—



Wood Screws, Machine Screws, Stove
Bolts, Tire Bolts, Sink Bolts, Tacks,
Trunk, Clout and Small Nails.

CLEVELAND, OHIO.

Tacks, Wire Nails and Brads, Hoop Nails, Staples,
Silver and Japanned Lining and Saddle Nails,
Double-Pointed Tacks, Slating and Roofing Nails.

BONNIE BLUE TACKS.

100 Kegs full of Tacks for \$1.50.

PARISIAN GILT NAILS.

20 Papers in a Carton. Carton retails for \$1.00;
costs 50 Cents.

BILL NYE BRAD BOX.

168 Papers Wire Brads, assorted, from 1/2 to 2
in. Each paper just right to retail for 5 cents.
Brings \$8.40; costs \$4.00.

BEST TACK PULLER IN MARKET. FULL OF TACKS.

Retails at \$7.20 per Gross. Costs \$4.00.

GUSTAVE EHRHARDT & SONS,

MACHINE TOOL WORKS.

MANUFACTURERS AND IMPORTERS OF IMPROVED METAL WORKING MACHINES.

Branch of HEINR. EHRHARDT, DUESSELDORF, GERMANY.

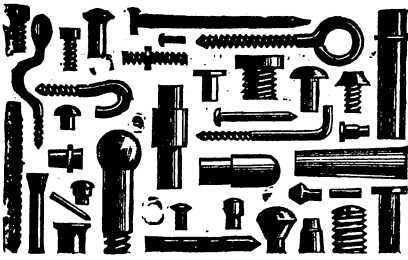
Cold Saws and Cold Sawing Machines of our own make a Specialty.

Machine Tools for Railway Shops, Bridge Builders, Architectural Iron Works, Steel
and Iron Foundries, Machine and Blacksmith Shops, Iron and Steel Works,
Rolling Mills, Forges, etc. Hydraulic Machinery.

Lathes for special purposes, Presses for Corrugated Iron, Straightening Machines, Milling
and Grinding Machines, and others.

Catalogues furnished on application.**Send for prices and discounts**

Machines can be seen in operation at our Works or at the Chicago Exposition.

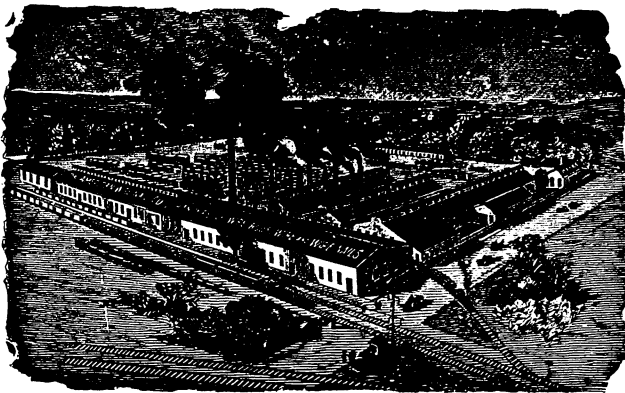


IRON AND BRASS RIVETS,

STUDS, PINS, SCREWS, &c.,

For Manufacturers of Light Hardware.

BLAKE & JOHNSON, WATERBURY, CONN.



The American Wire Nail Co.,

ANDERSON, IND.

STEEL
ROD
GALVANIZED
PLAIN
FENCE
ALL KINDS
WIRE NAILS.

WIRE

OLIVER WADE, Agt., 18 Broadway, New York.

NEW CASTLE WIRE NAIL CO.,

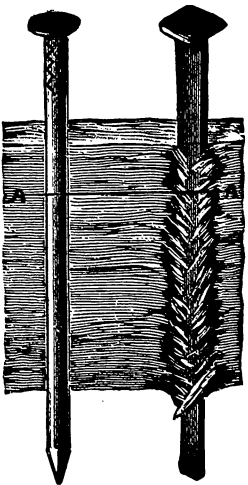
MANUFACTURERS OF



WIRE RODS AND WIRE.

Office and Works,

NEW CASTLE, PA.



THE SALEM WIRE NAIL CO.

MANUFACTURERS

WIRE NAILS,

Works: SALEM, O.; FINDLAY, O.

General Office: - SALEM, OHIO.

BRANCH OFFICES:

Room 28, 277 Broadway, New York.

415 Phenix Bldg., Chicago.

200 Amer. Central Bld'g, St. Louis.

19-20 Ainsworth Block, Portland, Ore.

H. PHILLIPS & SONS
SOUTH HANOVER, MASS.

TACKS

F. R. EMMONS & BRO
21 WARREN ST., NEW YORK.



FRANKLIN S. MILES,
Manufacturer of

Brass, Iron, Steel and German Silver

SCREWS,
205 Quarry St., Philadelphia.



CRESCENT STEEL CO.

480 PEARL ST.
NEW YORK

PITTSBURGH, PA.

64 & 66 S. CLINTON ST.
CHICAGO.

PIERSON & CO.,

—DEALERS IN—

IRON and STEEL

OF EVERY DESCRIPTION,

29 Broadway, cor Morris St.,
NEW YORK.

SOFT GRAY IRON CASTINGS.

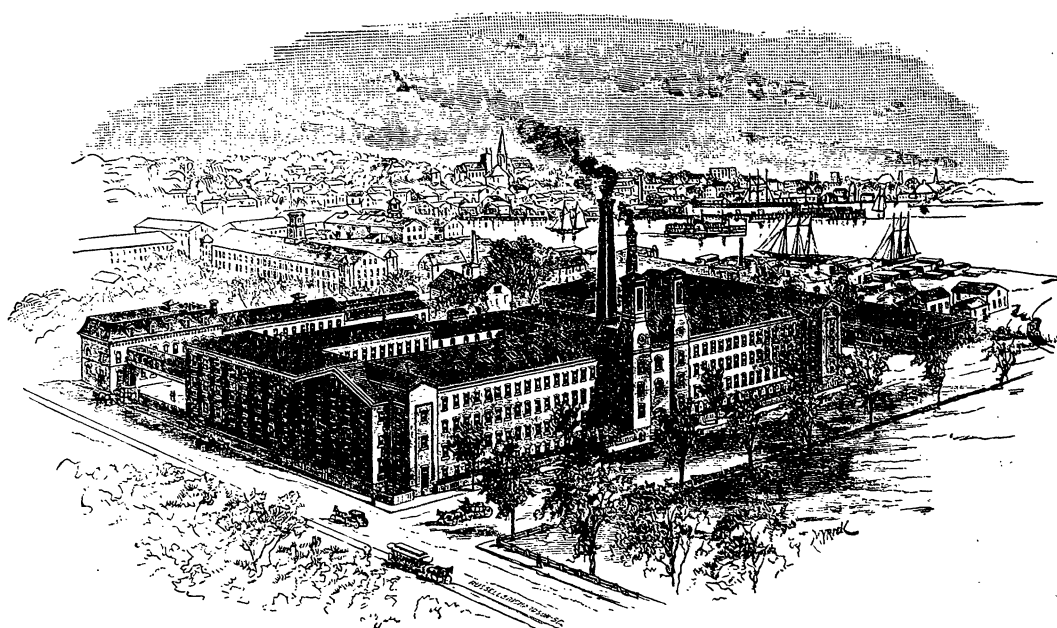
From ½ oz. to 1000 lbs. Small Castings a Specialty. Light Machinery wanted to build.

WEST COXSACKIE IRON FOUNDRY,
COXSACKIE, N. Y.

Voltaic Electricity. By T. F. Treglohan. 40 cents. For sale by **DAVID WILLIAMS, Publisher** and Bookseller, 98-108 Reade St., New York.

American Screw Company,

PROVIDENCE, R. I.



NEW ENGLAND MILL, PROVIDENCE, RHODE ISLAND, U. S. A.

MANUFACTURERS OF

WOOD SCREWS,

In Iron, Brass, Bronze and all Varieties
of Finish.

COACH SCREWS,

MACHINE SCREWS,

RAILROAD SCREWS,

HAND RAIL SCREWS,

SIDE KNOB SCREWS,

LOCK CAP SCREWS,

DOWEL SCREWS,

CHANDELIER SCREWS,

RIVETS, BURS,

TIRE BOLTS,

STOVE BOLTS,

SLEIGH SHOE BOLTS,

SINK BOLTS,

STOVE RODS,

POINTED WIRES,

TAPPED NUTS,

WIRE NAILS,

DOWEL PINS,

TAPS FOR MACHINE SCREWS,

TAPS FOR STOVE BOLTS.

**COLD
FORGED**

Rogers Drive Screws,
Side Knob Screws,
Lock Cap Screws,
Machine Screws,
Stove Bolts,
Forged Wood Screws,
Threaded Wires,
Fluted Tire Bolts.

American Screw Company,


PROVIDENCE, R. I.

Chicago Store, No. 19 Lake St.

EUROPEAN AGENTS, THOMAS & STIRLING, Liverpool

CONSOLIDATED STEEL AND WIRE CO.

GENERAL OFFICES, THE ROOKERY, CHICAGO, ILL.

Branch  Offices. { ST. LOUIS, MO., 1935 Papin Street.
PITTSBURGH, PA., Westinghouse Building.
NEW YORK CITY, N. Y., Havemeyer Building.
SAN FRANCISCO, CAL., 81 Crocker Building.

BARBED WIRE.

WIRE RODS and PLAIN WIRE of Every Description.

WIRE NAILS.

Bale Ties, Fence Staples, etc.

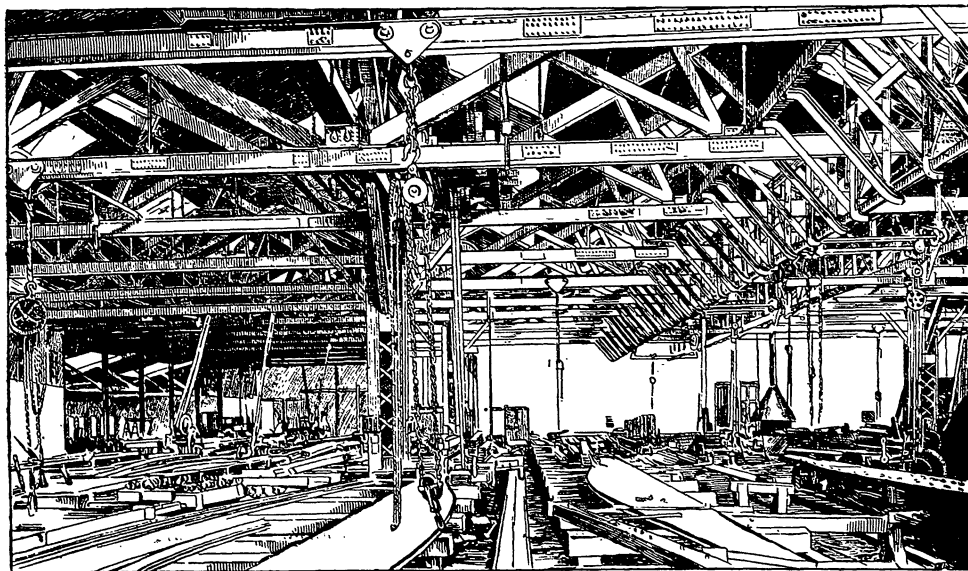
MILLS LOCATED AT

ST. LOUIS, MO. PITTSBURGH, PA. ALLENTOWN, PA.
JOLIET, ILL. LOCKPORT, ILL.

WROUGHT IRON BRIDGE CO. {

CANTON, OHIO.
NEW YORK CITY.
CHICAGO, ILL.
KANSAS CITY, MO.

COMMUNICATE WITH NEAREST OFFICE.



Iron Buildings, Roofs and
General Structural Work
in Iron and Steel, Ma-
chine Shops, Foun-
dries, Power
Houses, &c.

The above is a cut of our new works. The main building is 256 feet square and is fitted with improved machinery for handling all classes of Bridge and Structural work. All machinery is operated by electricity from our own plant.

IRON AND STEEL ROOFING,

Corrugated Iron, Galvanized Eave Trough
and Conductor Pipe, Roofing Paints, etc.

Cambridge Roofing Co., Cambridge, O.

— AMERICAN —
PIG IRON **Storage Warrant Co.**

(Bank of America Building.)

44 Wall Street, - NEW YORK.

Correspondence of Furnaces Invited.

New and Standard Books

- ON -

METALLURGY.

Wedding's Basic Bessemer Process.

Translated from the German by WILLIAM B. PHILLIPS Ph.D., and ERNST PROCHASKA, Met. E. With supplementary chapter on De-phosphorization in the Basic Open-Hearth Furnace. 222 pages; cloth; illustrated. \$3.50

A Treatise on the Metallurgy of Iron.

Containing outlines of the history of iron manufacture, methods of assay and analyses of iron ores, processes of manufacture of iron and steel, &c. By H. Bauerman, F. G. S., associate of the Royal School of Mines. Fifth edition, revised and enlarged. Illustrated with numerous wood engravings from drawings by J. B. JORDAN. 515 pages; cloth. \$2

The Metallurgy of Steel.

Volume I. By HENRY M. HOWE, A.M., S.B., mining and metallurgical engineer; illustrated with many engravings and plates. 393 pages; 11 x 14 inches. \$10

Handbook for Charcoal Burners.

Translated from the Swedish of G. Svedelius by PROF. R. B. ANDERSON, and edited with notes by PROF. W. J. L. NICODEMUS, C.E.; 23 wood engravings; 217 pages; cloth. \$1.50

The Metallic Alloys.

A practical guide for the manufacture of all kinds of alloys, amalgams and solders, used by metal workers; together with their chemical and physical properties and their application in the arts and the industries; with an appendix on the coloring of alloys. Translated and edited chiefly from the German of A. KRUPP and ANDREAS WILDBERGER, with extensive additions by Wm. T. BRANNT; illustrated by 16 engravings; 426 pages; cloth. \$2.50

The Metal Worker's Handy Book of Receipts and Processes.

Being a collection of chemical formulas and practical manipulations for the working of all the metals and alloys, including the decoration and beautifying of the articles manufactured therefrom, as well as their preservation. Edited from various sources by WILLIAM T. BRANNT. 530 pages; cloth. \$2.50

Electro-Plating.

A practical hand-book on the deposition of copper, silver, nickel, gold, aluminum, brass, platinum, &c. With descriptions of the chemicals, materials, batteries and dynamo machines used in the art. Second edition; carefully revised, with additions. By J. W. URQUHART; 220 pages; cloth. \$2

Steel and Iron.

Comprising the practice and theory of the several methods pursued in their manufacture, and of their treatment in the rolling mills, the forge and the foundry. By WILLIAM HENRY GREENWOOD, F.C.S. With 97 diagrams; 536 pages; cloth. \$2

Aluminum.

Its history, occurrence, properties, metallurgy and applications, including its alloys. By JOSEPH W. RICHARDS, M.A., A.C., instructor in metallurgy at the Lehigh University. Second edition, revised and greatly enlarged. Illustrated by 23 engravings and two diagrams; 511 pages; cloth. \$5

Sent, postpaid, on receipt of price, by

DAVID WILLIAMS,

Publisher and Bookseller.

96-102 Reade St., New York.

Gautier Steel Department of Cambria Iron Co.,

JOHNSTOWN, PA.,

MANUFACTURERS OF

Merchant Bar Steel:

Including Tire, Toe Calk, Machinery, Carriage Spring, Railroad Spring, Hoe, Rake, Fork, etc.

Agricultural Steel and Shapes:

Finger Bars, Knife Backs, Rake Teeth, Bundle Carrier Teeth, Tedder Forks and Springs, Spring Harrow Teeth, Harrow (Drag) Teeth, Seat Springs, etc.

Plow Steel:

Flat and Finished Plow Shapes, Digger Blades, Slabs (Penn and Pernot), Hammered Lay, Rolled Lay, etc.

COLD ROLLED STEEL SHAFTING.

STEEL HARROW DISCS.

CAMBRIA LINK BARB WIRE.

New York Office,

Philadelphia Office,

Chicago Office

102 Chambers St.

S. W. Cor. 5th & Commerce Sts.

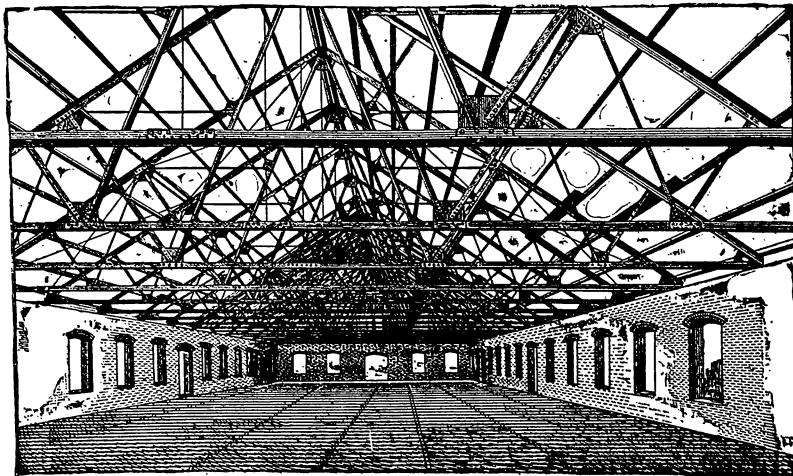
209 Phenix Building.

(No. 4.)

IRON AND STEEL BRIDGES, ROOFS AND BUILDINGS
BOSTON BRIDGE WORKS,

Engineers and Builders,

MASON BUILDING, BOSTON, MASS.



Roof of Machine Shop at Portsmouth (N. H.) Navy Yard.

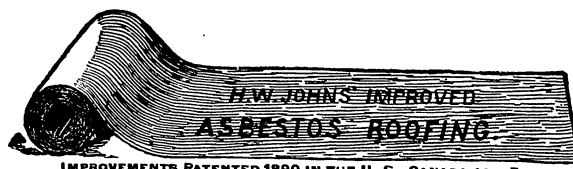
INQUIRIES SOLICITED.

D. H. ANDREWS, Prop'r.

J. R. WORCESTER, Chief Eng'r.

A. S. MILLER, Jr., Sec'y.

R. H. BROWN, Con. Eng'r



IMPROVEMENTS PATENTED 1890 IN THE U. S., CANADA AND EUROPE.

FIRE-PROOF. Easily applied by anyone. Send for Samples and Descriptive Price List.

H. W. JOHNS MANUFACTURING COMPANY,

H. W. Johns' Asbestos Fire and Water-Proof Sheathing, Building Felt, Steam Packings, Boiler Coverings, Liquid Paints, Roof Cement, Fire-Proof Paints, etc.

87 MAIDEN LANE, NEW YORK,

JERSEY CITY,

CHICAGO,

PHILADELPHIA,

BOSTON,

ATLANTA,

LONDON.

Lukens Iron ^{AND} Steel Co. INCORPORATED 1890.

The First to make Boiler Plates in America.

Chas. Huston, Pres. A. F. Huston, Vice-Prest. C. L. Huston, Genl. Mgr. Robt. B. Haines, Jr., Secy. Jos. Humpton, Treas.

STEEL AND IRON PLATES

TO EXTREME DIMENSIONS.

WIDTHS UP TO 10 FEET.

THICKNESS, 3-16 INCH TO 1½ INCH.

—ESTABLISHED 1810.—

WORKS:

Coatesville, Pa.

PHILADELPHIA OFFICE:

62 & 64 Bullitt Bldg.

FRANK SAMUEL,
136-138 So. 4th St.,
Philadelphia.

LOW PHOSPHORUS

PIG IRON—.03 or under.
SCRAP—.03 or .05 or under.
ORE—For O. H. and Furnace Use.
MELTING BAR—
Open Hearth and Bessemer Billets,
Skelp, Muck Bars and Scrap, Foundry
and Bessemer Pig Iron.
Syracuse Tube Co.'s Tubes and Pipe.

THE PHOENIX IRON CO., 410 Walnut St., Philadelphia,

MANUFACTURE ALL THEIR PRODUCTS BOTH IN

WROUGHT IRON AND OPEN HEARTH STEEL.

Beams, Channels, Deck Beams, Angles, Tee-bars, Zee-bars and other shapes, Round, Flat and Square BARS of all sizes, Especially adapted for Bridge and Ship Builders, Fire-proof Buildings, Shafting and all Structural Purposes. SPECIALTIES, in Wrought Iron or Steel:—Phoenix Columns and Upset Eye-Bars of all sizes, Roof Trusses, Girders, Joists and Built-up Shapes of every description.

AGENTS:—EDWARD CORNING & Co., 29 Broadway, NEW YORK; EDWARD CORNING & Co., 70 Kilby St., BOSTON, MASS; JAMES B. STOKES, 132 Market St., SAN FRANCISCO. WESTERN OFFICE: A. C. STITES, 931 The Rookery, CHICAGO.

POTTSVILLE IRON AND STEEL CO., POTTSVILLE, PA.

PHILADELPHIA OFFICE, 226 SOUTH 4th STREET

MANUFACTURERS OF ALL KINDS OF

STRUCTURAL IRON AND STEEL,

Viz., I Beams, Deck Beams, Channels, Tees, Angles, Plates and Bars; and also Open Hearth Steel Billets, Blooms and Slabs.

BREWERY, MALT AND ICE HOUSE CONSTRUCTION A SPECIALTY.

Designers and Constructors of Roofs, Trusses, Columns, &c.

TESTED CHAINS.

BRADLEE - & - CO., - EMPIRE - CHAIN - WORKS

Beach & Otis Sts., - - - Philadelphia.

Chains for Foundry Cranes and Slings, "D. B. G." Special Crane Chain. Steel and Iron Dredging, Slope and Mining Chains. Ship's Cables and Marine Railway Chains.

S. T. WELLMAN, President. J. H. ROOP, Treasurer. C. H. WELLMAN, Superintendent.
S. H. CHAUVENET, Vice-President. RICHARD PETERS, Jr., Secretary.

WELLMAN IRON AND STEEL CO.

—MANUFACTURERS OF—

Highest Grade Open Hearth Low Phosphorus Steel Fire Box and Boiler Plate. Bessemer Steel Ship and Tank Plate. Open Hearth and Bessemer Blooms and Slabs. Low Phosphorus Pig Iron.

—PLATES UP TO 126 INCHES IN WIDTH.—

General Office and Works, Thurlow, Delaware County, Pa.

Chicago, Ills., No. 656 "The Rookery."
E. W. CRAMER, Agent.

New York, N. Y., No. 7 Nassau Street
J. H. BELCHER, Agent.

BARCLAY W. COTTON & CO.,

Successors to ESHERICK, COTTON & CO.,

Iron and Steel Merchants.

AGENTS FOR

AMERICAN WIRE GLASS MFG. CO.

418 Walnut St., PHILA.

W. F. LIN WHEELER. G. W. NICOLLS

Nicolls, Wheeler & Co.,

FORMERLY

SITES, WHEELER & CO.,

116 South Third Street, Philadelphia, Pa.

—DEALERS IN—

IRON AND STEEL SCRAP,

Pig Iron, Muck Bars, Charcoal Blooms, &c., &c.
Steel and Iron Plates, New and Old Rails,

EDWARD CORNING & CO.,

MANUFACTURERS' AGENTS AND COMMISSION MERCHANTS.

BEAMS, CHANNELS,
ANGLES, TEES,
PLATES, BARS, RODS.

IRON AND STEEL

HOOPS, BANDS,
SPIKES, FISH-PLATES,
BOLTS, NUTS, RIVETS.

29 BROADWAY,
NEW YORK.

237 SO. THIRD ST.,
PHILADELPHIA.

70 KILBY ST.
BOSTON.

CORRESPONDENCE SOLICITED WITH BUYERS AND WITH MANUFACTURERS.

EDWARD J. ETTING,
IRON BROKER & COMMISSION MERCHANT
 222 S. THIRD ST., PHILADELPHIA, PA.
 Pig, Bar and Railroad Iron, Old Rails, Scrap.
 AGENT FOR THE
MOUNT SAVAGE FIRE BRICK,
 Eastern Penna., West New Jersey and Delaware.
Agent TRENTON IRON CO.,
 For the Sale of Wire and Wire Rope.
 Longdale (Va.) and other Pig Irons.
 STORAGE YARD, Pier No. 57 South (old Navy Yard),
 which is connected with Penn. R. R. and its various
 connections. Negotiable Warehouse Receipts issued.
 CASH ADVANCES MADE ON IRON.

ESTABLISHED 1869.
JEROME KEELEY & CO.,
 303 WALNUT STREET, PHILADELPHIA.
Foundry & Forge Pig Irons,
Iron Ores, Coke, Coal,
Steel Blooms, Billets, Rails, etc.
Muck Bars, Blooms, Scrap Iron.
 Consulting Engineers in Metallurgy and
 Mining.

E. H. Wilson. A. Kaiser. J. B. M. Hiron.
E. H. WILSON & CO.,
 222 and 224 South Third St., Philadelphia
 BROKERS AND DEALERS IN

IRON AND STEEL.
 Correspondence solicited.

J. W. Hoffman & Co.,
 333 and 335 Walnut Street.
COMMISSION MERCHANTS
PIG IRON,
 Iron and Steel Plates and Shapes. Rails, Cars and
 Locomotives, and Railroad Equipment generally.
 CORRESPONDENCE SOLICITED.

JOHN L. HOGAN & CO.,
 IRON COMMISSION MERCHANTS,
 Bullitt Building, 135 South Fourth St., Phila.
 Agents for Brier Hill, Lehigh, Struthers
 AND MUIRKIRK PIG IRON,
 Delaware Rolling Mill, muck bars. Youngstown Steel
 Co., Connellsville Coke.

NORTH BROTHERS MFG. CO.,
Iron and Brass Founders,
Light Castings a Specialty.
 N. W. Cor. 23d and Race Streets,
 PHILADELPHIA.
 Correspondence solicited.

W. H. THOMSON & CO.,
 Dealers in
IRON and STEEL and
other METALS
 FOR ALL PURPOSES,
 Room 259, Bullitt Building,
 PHILADELPHIA, PA.

LUCKNOW FORGE.
JOHN W. REILY
 Fort Hunter, P. O., Dauphin Co., Pa.
 MANUFACTURER OF
 Blooms and Billets for Boiler Plate, Tubes,
 Sheet Iron and Wire, made from
 Pig Iron and Scrap.
 Prices Quoted—Correspondence Solicited.

C. B. Houston. J. Max Bernard. H. H. Houston.
C. B. HOUSTON & CO.,
 Bullitt Building. PHILADELPHIA.

Pig Iron, Coal, Coke, Steel Rails, Structural
 Iron, Steel Castings and Fire Brick.
 Sole Agents for PAXTON ROLLING MILLS.
STEEL AND IRON PLATES

W. S. PILLING.

PILLING—AND—CRANE.

IRON ORES: Lake Superior, Foreign, Concentrates,
 Magnetic and native Self-fluxing.
PIG IRON: Low Phosphorus, Open-hearth, Bessemer
 and other grades.
STEEL: In Blooms, Slabs and Billets, and scrap.
COKE: For Furnace and Foundry use.

BULLITT BUILDING, 141 S. FOURTH ST. PHILADELPHIA.

H. R. MANN & CO.,
 Sole Agents.

ACME PIG IRON.

Guaranteed .03 % or lower in Phosphorus.

Blooms, Slabs, Plates, Sheets, Skelp, Muck-Bar and Scrap. Foreign and
 American Ore. Riverside Steel Pipe. Syracuse Boiler Tubes.

147 SOUTH 4th STREET, - - PHILADELPHIA.

ALAN WOOD COMPANY,

MANUFACTURERS OF

Patent Planished, Galvanized, Common, Best Refined, Cleaned and Charcoal Bloom,
PLATE & SHEET IRON.

ALSO LIGHT PLATES AND SHEETS OF STEEL,

No. 519 Arch Street, Philadelphia, Pa.

Orders solicited especially for Corrugated, Gasholder, Pan and Elbow, Water Pipe, Smoke Stack
 Tank and Boat Iron; Last, Stamping, Ferrule Locomotive Headlight and Jacket Iron.

CUMBERLAND NAIL AND IRON CO.,

MANUFACTURERS OF

"Cumberland" Nails & Wrought Iron Pipe,
 43 North Water St., and 44 North Delaware Ave., PHILADELPHIA.

J. J. MOHR,

Bullitt Building, No. 131 South Fourth St., Philadelphia, Pa.

—SOLE AGENT FOR—

Sheridan, Temple, Brooke, Leesport, Mill Creek, Keystone, Mt. Laurel, Logan and Oley FOUN-
 DRY, FORGE, CHARCOAL AND BESSEMER PIG IRON.
 Dealer in Scrap, Old Car Wheels, Muck Bars and Connellsville Coke.

High Grade Tested Chains.

JAMES MCKAY & CO.,

29TH & LIBERTY STREETS, PITTSBURGH, PA
 Manufacturers of Coil, Crane and Stud Chain. We also manufacture High Grade
 Steel Chain made of Basic Steel and Special Crane Chain made of U. S. Iron.

JAMES G. LINDSAY & CO.,

BULLITT BUILDING, 133 South Fourth St., PHILA.

IRON and STEEL STRUCTURAL MATERIAL

For all purposes. Estimates Furnished for Iron and Steel Structures.



MERRILL BROS., 465 to 471 Kent Ave., Brooklyn, E.D., N. Y

FITZSIMONS & CO.,

—MANUFACTURERS—

COLD DRAWN **SHAFTING** **IRON STEEL**

CLEVELAND, OHIO.

FRANCIS HOBSON, SEAMAN & CO.,

Successors to FRANCIS HOBSON & SON,
DON STEEL WORKS, SHEFFIELD.

Sole Manufacturers of

HOBSON'S "CHOICE" **(XX)** Extra Best and "Warranted Best"
Cast Steels for Tools, etc.

HOBSON'S "CHOICE" Extra Quality Needle Wire.

SEAMAN'S "NELSON" Brand Extra Cast Steel for Turning Hardest Chilled Rolls, &c.
WAREHOUSE, 97 John St., New York. CHAS. HUGILL, Agent.

THOS. FIRTH & SONS, LIMITED, SHEFFIELD. CRUCIBLE CAST STEEL.

JERE ABBOTT & CO., Agents and Importers of
SWEDISH IRON,

85 OLIVER ST. BOSTON.

23 CLIFF ST., NEW YORK

S. & C. WARDLOW, SHEFFIELD, ENGLAND.

Manufacturers of the Celebrated Cast and Double Shear Steel.

In Bars, Sheets and Coils, for fine Pen and Pocket Cutlery, Razors, Carvers, Butchers' Knives, Files, Band Saws, Clock, Watch and all other Springs; also Sole Makers of the Special Brand "TOUGH" Cast Steel for Leather Splitting and all other Tools, Dies and Punches.

Office and Warehouse, 95 John St., New York.

Frank S. Pilditch, Agent.

GUSTAF LUNDBERG,

AGENT FOR N. M. HÖGLUND'S SONS & CO., OF STOCKHOLM

Swedish and Norway Iron.

Bessemer and Open Hearth Steel.

19 KILBY STREET, BOSTON.

CARLISLE **KAYSER, ELLISON & CO., SHEFFIELD, ENGLAND.**
WORKS, Late WILSON HAWKSWORTH, ELLISON & CO.,

(ESTABLISHED 1834.)

CRUCIBLE STEEL AND STEEL WIRE.

WETHERELL BROS., Agents,

81 OLIVER STREET, BOSTON.

98 LIBERTY STREET, NEW YORK.

JONAS & COLVER CONTINENTAL STEEL WORKS, SHEFFIELD, ENGLAND,

MANUFACTURERS OF ALL KINDS OF STEEL.

Tool Steel, Drill Rods, Needle Wire, Hot Rolled Sheet Steel, Cold Rolled Steel for Corset Springs, Band Saws, Clock and Watch Springs and Parts, and all other Purposes.

HERMANN BOKER & CO., 101 & 103 Duane Street,

(Formerly CARL F. BOKER),

Sole Agents and Importers of Steel and Crucible Wire Rods, &c.

JESSOP'S STEEL

MANUFACTURED BY

OF **Best Quality,**
IN **Bars, Sheets and Plates.**

Large assortment of sizes in stock at

91 John St.

NEW YORK

And other Agencies.

WM. JESSOP & SONS, L'D.

SHEFFIELD, ENGLAND.

Gold Medal Paris.
1889.

"F.W. MOSS" SHEFFIELD STEEL & FILES

For further particulars apply
to

NEWTON &

SHIPMAN.

83 John St., New York.

Prices for Direct Importation in Wholesale Quantities From Sheffield.

Improved Mild Centered Cast Steel for Taps, Reamers, &c.	@ £59	Per ton in Sheffield.
Warranted Extra Cast Steel for Taps, Dies, Milling Tools, &c.	50	" " "
Warranted Cast Steel for tools, Taps, Dies, Turning Tools, &c.	44.10/	" " "
Best Crucible Machinery Steel	80	" " "
Best C. S. EXTRA WEIGHT HAND CUT FILES	@ 50% & 4% cash discount	" " "

No charge for extra sizes when steel is ordered in wholesale quantities of assorted sizes.

PENNSYLVANIA STEEL COMPANY. WORKS AT STEELTON, PA.

RAILS OF ALL SIZES & SHAPES. RAILROAD CROSSINGS AND SWITCHES.

STEEL SPLICES AND FASTENINGS. ANGLES & BARS. SWITCH FIXTURES &c.&c.

BILLETS, SLABS, BLOOMS FOR BOILER BRIDGES, ROOFS, RAILROADS, STREET RAILWAYS.

RIVETS, WIRE, NAILS, AND VARIOUS PURPOSES. VIADUCTS & BUILDINGS. MINES, QUARRIES, MILLS, FACTORIES, & WORKS.

FOR TRACKS OF ALL SORTS, IN

GENERAL OFFICES, 108 So. Fourth St., PHILADELPHIA. NEW YORK SALES OFFICE, No. 2 Wall Street (corner Broadway). BOSTON SALES OFFICE, 70 Kilby Street (Mason Building). SUPERINTENDENT'S OFFICE, STEELTON, PA.

ÆTNA-STANDARD IRON AND STEEL CO.,

Successors to Ætna Iron and Steel Co., and The Standard Iron Co., Manufacturers of

PLATES and SHEETS, BLACK, GALVANIZED and CORRUGATED Plain Roofing, Siding and Ceiling, also of Sheet Steel, for special purposes, Cold Rolled or Plain and Patent Leveled.

BARS, LIGHT SECTION RAILS, ANGLES, TEES and CHANNELS, odd sections and sizes, Machine Straightened Steel Tire, Ordinary Shafting, Horse-Shoe Bars, Ax-Poll Steel, Toe Calk, Nut Bolt and Chain Rods, and other special Bars suited to every requirement.

PROMPT SHIPMENT from STOCK.

Inquiries solicited. Stock List Mailed on Application. Address, **BRIDGEPORT, OHIO.**

ILLINOIS STEEL COMPANY

General Offices, TENTH FLOOR, "ROOKERY," CHICAGO, ILL.,

— MANUFACTURE —

Bessemer, Foundry and Mill Pig Iron, Spiegel and Ferro-Manganese,

Iron and Steel Merchant Bar, Rail Fastenings, Light "T" and Street Rails,

Steel Billets, Wire Rods, Iron or Steel Car Truck Channels,

Steel "I" Beams and Structural Shapes, and

BESSEMER STEEL RAILS.

Julian L. Yale,

Gen'l Sales Agent.

A. M. Crane,

Assistant Gen'l Sales Agent.

New York Office, 46 Wall St., New York City. Milwaukee Office, 151 N. W. Ins. Bldg., Milwaukee, Wis.
D. E. GARRISON & CO., Agents, Laclede Building, St. Louis, Mo.

H. S. PICKANDS, } CHICAGO.
W. L. BROWN, }

PICKANDS, BROWN & CO.,

PICKANDS, MATHER & Co.,
CLEVELAND.

Sole Agents Pig Iron Department Illinois Steel Company and Manufacturers and Dealers in

PIG IRON and IRON ORB,

1007, 1009 and 1011 Rookery Building, Chicago.

CARBON STEEL COMPANY,

PITTSBURGH, PA.,

— MANUFACTURERS OF —



Universal Mill Plates. Sheared Plates and Sheets. Boiler, Ship and Armor Plates. Also Nickel Steel Plates. List of Sizes Sent upon Application.

AGENCIES:

L. S. BOOMER, 647 The Rookery, Chicago, Ill. THE CONDIT-FULLER CO., Perry-Payne Building, Cleveland, O.
GEO. KINSEY & CO., 249 West Fourth Street, Cincinnati, O. JAS. G. LINDSAY & CO., Bullitt Building, Philadelphia, Pa.
BULLARD & POST, 125 Milk St., Boston, Mass.

IRON AND STEEL

BARS, ANGLES, CHANNELS, BEAMS AND STRUCTURAL SHAPES.

Bridge, Boiler, Tank and Ship Plates.

FOUNDry and FORGE

Pig Iron, Steel Slabs, Billets and Ingots

CHARLES K. BARNES & CO..

224 South Fourth St., PHILADELPHIA.

L. & R. WISTER & CO.,
IRON COMMISSION MERCHANTS,

257 So. 4th St., Philadelphia.

Agents for the following Foundry and Forge Pig Irons: Dunbar, Kemble, Tuscarawas (Black Band), Wyebrooke C. & Charcoal Pig Iron, Warner & Co.'s (Middlesboro, England) Carbonizing and Malleable Irons. Dealers in all kinds of Scrap Iron and Steel.

HENRY LEVIS & CO.,
Manufacturers' Agents

For Iron and Steel Rails, Car Wheels, Boiler and Sheet Iron and General Railway Equipments.
Old Rails, Axles and Wheels bought and sold
284 S. 4th St., Philadelphia.

Established 1847.

A. WHITNEY & SONS,
CAR WHEEL WORKS,
PHILADELPHIA.

Special Wheels for Furnace and Mine Cars.

Manhattan Rolling Mill.

JOHN LEONARD,
446 to 452 West St., New York.

MANUFACTURER OF
HORSE SHOE AND BAR IRON
BLACKSMITH SUPPLIES.
Brooklyn Branch, 589 Kent Ave.

OGDEN & WALLACE,

85, 87, 89 & 91 Elm St., New York.

IRON AND STEEL

Of every description kept in stock.

Agents for Park, Brother & Co.'s
BLACK DIAMOND STEEL.

All sizes of Cast and Machinery Steel constantly on hand.

WILLIAM H. WALLACE & CO.,
IRON AND STEEL,

10, 12 and 14 ALBANY ST.,
and 131 WASHINGTON ST.,
NEW YORK.

Wm. H. Wallace. Wm. Bispham. E. C. Wallace.

THE MAHONING VALLEY IRON CO.

—MANUFACTURERS OF—

Bar, Band, Sheet, Plate and Tank Iron,
Angle Iron, Nails, Boat Spikes and Rivets

YOUNGSTOWN, OHIO.

THE BETHLEHEM IRON COMPANY,

SOUTH BETHLEHEM, PENNA.

STEEL RAILS, BILLETS AND MUCK BAR, STEEL FORGINGS.

HOLLOW SHAFTING, CRANKS, ROLLS, GUNS AND ARMOR.

Rough, Machined or Finished, Fluid Compressed, Hydraulic Forged.

NEW YORK OFFICE, - - - 80 BROADWAY.
PHILADELPHIA OFFICE, - - - 421 CHESTNUT ST.

PASSAIC ROLLING MILL CO., Paterson, N. J.

—MANUFACTURE—

ROLLED STEEL or IRON BEAMS

Channels, Angles, Tees, Bars, Riveted Work, Forgings, Eye Bars, &c., &c.,

Also OPEN HEARTH STEEL BILLETS and SLABS.

NEW YORK OFFICE, - Rooms 151 and 152, No. 45 Broadway.

JUSTICE COX, Jr., IRON AND STEEL

No. 218 SOUTH 4th ST., PHILA'D, PA.

Agent for Haldeman, Grubb & Co.'s Chickles Bessemer Pig Iron, Mahoning Rolling Mill Co.'s Best Quality Skelp Iron and Steel, Pulaski Iron Co.'s High Grade Foundry and Forge Pig Iron.

Bars, Angles, Sheets, Tank and Bridge Plates, Muck Bars, Blooms, Scrap Iron and Tool Steel.

THE MONTGOMERY IRON & STEEL COMPANY,

DANVILLE, PA.



PIG IRON, T AND STREET RAILS,

Light Rails, 12 to 40 lbs. per yard.

RAIL JOINTS, SPIKES AND BAR IRON.

NAYLOR & CO.,

New York: 45 Wall Street.

PITTSBURGH, PA.: Lewis Block. PHILADELPHIA, PA.: Bullitt Bldg.
CINCINNATI, OHIO: Johnston Bldg.

IRON ORE, PIG IRON, SPIEGEL AND FERRO,

IRON AND STEEL WIRE RODS, STEEL BLOOMS, BILLETS AND
SLABS, METALS AND OLD MATERIALS.

R. MUSHET'S "SPECIAL," STEEL "TITANIC,"

FOR LATHE AND PLANER TOOLS.

For Chisels, Taps, Dies, Chilled Roll Turning, Punches, &c., &c.

(The "Trade-Marks" of which are registered in the United States.)

MANUFACTURED ONLY BY

SAMUEL OSBORN & CO., - - - Clyde Steel & Iron Works, Sheffield, Eng.

SOLE REPRESENTATIVES IN THE UNITED STATES.

B. M. JONES & CO., Nos. 11 and 13 Oliver St., Boston.
No. 143 LIBERTY STREET, NEW YORK.

STEEL

Gautier Steel.

SEE PAGE 16

ESTABLISHED IN 1848.

SINGER, NIMICK & CO., Ltd.

PITTSBURGH, PA.

—MANUFACTURERS OF ALL KINDS OF—

Hammered and Rolled**STEEL.****Warranted Equal to any Produced.****HIGH GRADE SPECIAL Crucible Tool Cast Steel**, for all purposes requiring the **very finest** quality.**SINGER'S ANNEALED EXTRA Crucible Tool Cast Steel**, for Dies, Cutters, Surgical Instruments, Forceps, and all other purposes requiring an **extra fine** quality.**BEST Crucible Tool Cast Steel**, for all purposes requiring steel of **Standard** quality, such as Turning Tools, Taps, Dies, Drills, Punches, Shear Knives, Cold Chisels, or Edge and Machinists' Tools generally, and for Mining and Quarrying purposes.**SAW STEEL**, for Circular, Mulay, Mill, Gang, Drag, Pit and Cross-Cut Saws.**HOT ROLLED SHEET STEEL**, for Springs, Billet Web and Hand Saws, Nicker Saws, Pocket Knives, Blades and Backs, Drawing and Stamping Cold, &c., &c.**BRIGHT COLD ROLLED SHEET and STRIP STEEL**, for Cold Drawing, Stamping and Bending; for Bells, Cups, Ferrules, Springs, Keys, Chains, Sewing Machine and Type-Writer parts, and to take the place of Sheet Brass, all of unequalled finish and accuracy of gauge.**ROUND MACHINERY STEEL**, for Shafting, Rollers, Spindles, &c., &c.**AGRICULTURAL STEEL.**

"Iron Centre" Cast Plow Steel.

"Soft Steel Centre" Cast Plow Steel.

"Soft Steel Back" Cast Plow Steel.

"Extra Thick Face Centre" Cast Plow Steel.

"Special" (Solid Soft Center) Plow Steel.

Crucible Cast Plow Steel.

Steel Rotary Harrow Discs.

Finished Rolling Plow Colters.

Agricultural Steel Cut to Pattern.

Also Wagon and Carriage Springs, Axles and Steel Tire.

Represented at **243 Pearl and 18 Cliff Streets, NEW YORK**, by**HOGAN & SON, General Agents for Eastern and New England States.**

GEORGE M. HOGAN, 417 Commerce St., Philadelphia; FITZ, DANA & CO., 110 North St., Boston, and

W. E. STOCKTON, 16 & 18 West Lake St., Chicago.

HUGH RUSSEL, TEMPLE BUILDING, 185 ST. JAMES ST., MONTREAL, CANADA.

LA BELLE STEEL CO.,

Ridge Avenue and Belmont Street, Allegheny City, Pa. Post Office Address, Pittsburgh, Pa

MANUFACTURERS OF ALL KINDS OF STEEL SPRINGS, AXLES, RAKE TEETH, Etc.**WETHERELL BROS., EASTERN REPRESENTATIVES, 31 Oliver St., Boston and 93 Liberty St. N.Y.**

RICE, LEWIS & SON, Toronto, Ont.

J. TATNALL LEA & CO.,

No. 125 So. Fourth St., Philadelphia.

**BESSEMER, MILL AND FOUNDRY PIG IRON,
MUCK BARS AND IRON ORES.**

— SOHO IRON & STEEL WORKS —

MOORHEAD & McCLEANE CO.
MANUFACTURERS OF
PLATE IRON & STEEL.
GALVANIZED SHEET IRON
CHIB TRADE MARK
CORRUGATED & ROOFING IRONS
PLATES SPECIAL WIDE SHEETS AND EXTRA LONG SKELP IRONS
OFFICES AND WORKS.
PITTSBURGH.
EASTERN WAREHOUSE. No. 81 JOHN STREET, NEW YORK.
WESTERN WAREHOUSE. Nos. 16 & 18 W. LAKE ST. CHICAGO.

W. Dewees Wood Co.,

MANUFACTURERS OF PATENT

PLANISHED SHEET IRON.**PATENTS:**

Feb. 6th, 1877.	Feb. 12th, 1884.	Jan. 6th, 1885.
Dec. 10th, 1878.	Mar. 4th, 1884.	Aug. 31st, 1886.
Jan. 10th, 1882.	April 15th, 1884.	Jan. 1st, 1889.
Jan. 1st, 1884.	June 10th, 1884.	Jan. 17th, 1893.

Guaranteed fully equal, in all respects, to the Imported Russia Iron.

—ALSO—

Wood's Smooth Finished Sheet Irons and Sheet Steel, Cleaned and Free from Dust.

GENERAL OFFICES AND WORKS:

McKEESPORT, PA.

Branch Office: 111 Water Street, Pittsburgh, Pa.

J. WESLEY PULLMAN,
No. 238 S. Third St., Philadelphia.
BEST IRON ORES
New Jersey. New York. Lake Superior.
WARWICK PIG IRON.

STAY-BOLT, RIVET, D. LINK, AXE, HATCHET, CARRIAGE AND WAGON AXLE IRON.

SUPERIOR QUALITY REFINED BAR IRON, "VULCAN" AND "LOCKHART" BRANDS.

LOCKHART IRON & STEEL CO.
PITTSBURGH, PA.

ALL MERCHANT BAR SIZES OF SOFT STEEL.

SMALL CHANNELS AND ANGLES.
HEXAGON IRON AND STEEL.

The THOMSON ELECTRIC WELDING COMPANY

has made an Elaborate Exhibit in the Electrical Building at the World's Fair.

A great variety of Specimens have been sent by many Business Firms using Electric Welding Apparatus, among whom are the following :

Studebaker Bros. Mfg. Co., South Bend, Ind.
Haydock Bros. St. Louis, Mo.
The Johnson Co., Johnstown, Pa.
General Electric Co., Lynn, Mass.
Parry Mfg. Co., Indianapolis, Ind.
Shuttler & Hotz, Chicago, Ill.
Electric Pipe Bending Co., Harrison, N. J.
Gendron Iron Wheel Co., Toledo, O.
Benedict & Burnham Mfg. Co., Waterbury, Conn.

Tamarack-Osceola Copper Mfg. Co., Dollar Bay, Mich.
American Projectile Co., Lynn, Mass.
Carnegie, Phipps & Co., Pittsburg, Pa.
Washburn & Moen Mfg. Co., Worcester, Mass.
Trenton Iron Co., Trenton, N. J.
M. Seward & Sons, New Haven, Conn.
Cortland Forging Co., Cortland, N. Y.
Niles & Scott, La Porte, Ind.
Richmond Cedar Works, Richmond, Va.

Representatives of the Company will be constantly on hand to give any information that may be desired and to make arrangements for apparatus with those who may desire to adopt the Electric Welding Process.

THOMSON ELECTRIC WELDING COMPANY,

89 State Street, Boston, Mass.

MAHONING FOUNDRY & MACHINE SHOP,

BUILDERS OF

Blast Furnaces, Rolling Mill and Mining Machinery,

ROTARY SQUEEZERS, ORE CRUSHERS, ROLL TRAINS, SHEARS, IRON TRUCKS, &c.

Makers of Castings of all descriptions for cable and electric railroads, building fronts, columns, etc. Address

FRANK JAMESON, Manager, Danville, Pa.



Hundreds of testimonials showing these castings have proved the most satisfactory and economical for all purposes requiring strength and durability.

CHROME STEEL WORKS,
Brooklyn, N. Y.

DROP-FORGINGS

—AND—

DIES TO ORDER.

First Class Work.

THE HERBRAND CO., - FREMONT, O.

A. R. WHITNEY & CO.,

MANUFACTURERS AND DEALERS IN

IRON and STEEL.

AGENCIES:

CARNEGIE STEEL CO., Limited, Structural Material, Steel and Iron Columns, Beams, Channels, Shapes and Plates. Steel Beams Rolled to 24 inches deep.

PORTAGE IRON CO., Limited, Merchant Iron, Bars, Angles, Hoops and Cotton Ties.

BROOKLYN WIRE NAIL CO., Steel Wire Nails. Export Nails a Specialty.

RIVERSIDE IRON WORKS, Steel Pipe. GLASGOW TUBE WORKS, Boiler Flues.

AMERICAN WIRE NAIL MACHINES. Over 900 working satisfactorily in the United States, 25 in Europe and 100 in Canada.

THE SEIDELL & HASTINGS CO., Charcoal-Iron Boiler Plates.

Plans and estimates furnished and contracts made for Iron and Steel Structures of every description. Please address,

29 Broadway, New York.

P. O. Box 33.

TAYLOR

IRON AND STEEL COMPANY.

STEEL FOUNDERS

Licensees in the United States for making Hadfield's Manganese Steel.

STEEL CASTINGS OF EVERY DESCRIPTION.

Specialties: Steel Tired and Solid Steel Wheels; Chilled Iron Wheels; Iron and Steel Axles, etc., etc.

General Office and Works, High Bridge, New Jersey.

RIVERSIDE IRON WORKS,

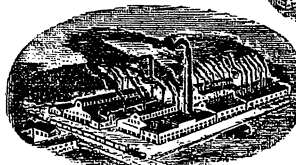
Manufacturers of

"RIVERSIDE"
Steel Nails.

Bessemer, Forge and Foundry Pig Iron.

"RIVERSIDE"
Steel Pipe.

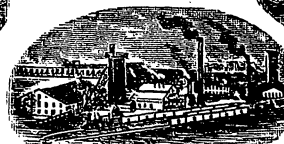
Steel Billets, Blooms, Bar Steel, T and Flat Rails



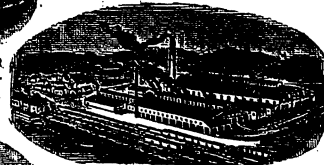
BAR MILLS, FORGE AND COAL MINES AT WHEELING, W. VA.



RIVERSIDE FURNACE, BESSEMER STEEL PLATE MILL AND TUBE DEPARTMENTS AT BENWOOD, W. VA.



FURNACE AND COAL SHAFT AT STEUBENVILLE,



NAIL FACTORIES AND WAREHOUSE AT WHEELING, W. VA.

WHEELING, W. VA.

New York Office, 21 Beekman St.

Charles S. Stephens, Eastern Representative.

CHESS BROTHERS,

MANUFACTURERS OF A FULL LINE OF

SMALL CUT NAILS, TACKS, SHOE NAILS, ETC.

Always in stock. Special goods made to order.

SOFT STEEL PLATES.

Suitable for Implement manufacture and for all Blanking or Stamping uses, of good surface, rolled carefully to gauges, ranging from No. 6 to 16, inclusive, in widths up to 15½ inches and to multiples of lengths desired. Finished black or scaled. And

EXPANDED METAL

In all its varieties of Fire-Proof Lath Fencing, Tree Guards, &c. Send for catalogues and prices.

Office, 531 Wood St., PITTSBURGH, PA.

DROP FORGING

J.C. SPEIRS & CO. WORCESTER. MASS.

J.S. SEAMAN.
ROBT. SLEETH
GEO. BLACK

PHOENIX ROLL WORKS
SEAMAN, SLEETH & BLACK
OFFICE & WORKS
41ST & 42ND ST & AV. R.R.
PITTSBURGH, PA.

ESTABLISHED 1870

ROLLS AND PINIONS
EXCLUSIVELY
FOR ALL PURPOSES.

MANUFACTURE AND FINISH

ROLLS. ESTD. AND 1863. PINIONS.

THE TOTTEN & HOGG
IRON & STEEL
FOUNDRY CO.
OFFICE & WORKS
24TH ST & AV. R.R.
PITTSBURGH, PA.

CHILLED & SAND ROLLS
ROCK CRUSHERS.

SHEARS
SQUEEZERS AND ROLLING MILL MACHINERY...

THE CAMBRIDGE IRON & STEEL CO.
MANUFACTURERS OF
SHEET IRON AND SHEET STEEL

Squared Roofing Sheets a Specialty.

CAPACITY RANGES FROM NO 30
26 INCHES WIDE TO 1-4x40x120

CAMBRIDGE REFINED IRON. TRADE MARK

CAMBRIDGE SOFT STEEL. TRADE MARK

CORRESPONDENCE SOLICITED

OFFICE AND WORKS CAMBRIDGE, OHIO.

— ESTABLISHED 1850. —

ARCADE MALLEABLE IRON CO.

WARREN MCFARLAND & CO.

Malleable Iron and Steel Castings,
WORCESTER, MASS.

Correspondence solicited. Prices given upon receipt of patterns or samples.

GEO. B. BUCKINGHAM.

John H. Ricketson, Prest. Wm. Holmes, Treas
A. G. Barnett, Sec'y.

A. GARRISON FOUNDRY CO.,

Manufacturers of Sand, Patent Homogeneous, Steel and

Chilled Rolls

Ore and Clay Pulverizers, Rotary Squeezers,
Haskin's Patent Double Spiral Pinions and Roll-
ing Mill Castings of every description.

Office, Nos. 10 & 12 WOOD ST., PITTSBURGH, PA.

BIRMINGHAM IRON FOUNDRY,
BIRMINGHAM, CONN.**CHILLED ROLLS AND ROLLING
MILL MACHINERY,**

McCoy Patent Mill Pinions,
Shears, Rotary Squeezers.

WIRE DRAWING MACHINERY

Special Rolling Machines for Gun Bar-
rels, Hoes, Pick and Axe Polls, Odd
Shapes and Tapers.

ESTABLISHED

1836.

POWDER

—FOR—

Blasting, Mining and Sporting.
ORANGE BRAND.
ELECTRIC BLASTING APPARATUS,
SAFETY FUSE, &c.

Send postal card for Illustrated Pamphlet,
showing sizes grains Powder, and describing
Blasting Apparatus. Mailed **FREE**.

LAFLIN & RAND POWDER CO.,

New York Office, 29 Murray St.

DYNAMITE,**RED STAR BRAND**

For Mining, Quarrying & Stump Blasting.

Safety Fuse, Caps, Platinum Fuse, Leading
and Connecting Wire, with every other requis-
ite for Blasting Purposes. The especial atten-
tion of the hardware trade is invited to our
line of goods.

NEW YORK POWDER CO.,

62 Liberty St., New York.

VULCAN IRON WORKS
CHICAGO
PILE DRIVERS

S. CHENEY & SON,
GRAY IRON CASTINGS,

CHEAP HEATING STOVES,

DIAMOND THIMBLES,

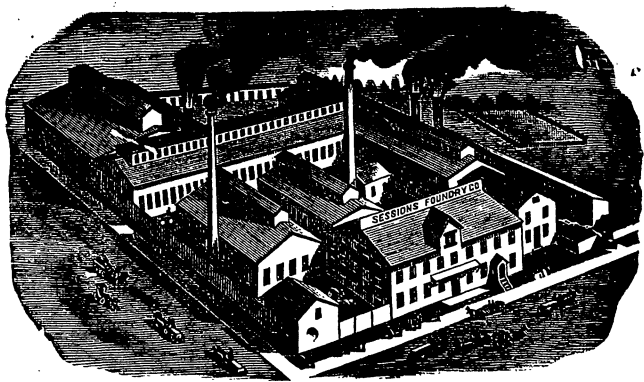
MANLIUS, N. Y.

IRON CASTINGS TO ORDER.

Small and Large Grey (or common) Iron Castings of uncommonly fine quality. Four large Cupolas run daily. Castings soft, smooth and strong. Prices very Low.

We make Castings for all purposes, such as Builders' and Domestic Hardware, Electrical work, Piano and Organ, Wringer, Furniture, Lamp and Chandelier and Agricultural Implement Castings, Grates, Furnace and Machinery Castings, &c., &c. *If you buy any, write us, stating quantities. Send samples if possible.*

SESSIONS FOUNDRY CO., Bristol, Conn.



Machinery Pattern Making

CONTAINING
FULL SIZE PROFILES OF GEAR TEETH
AND FINE ENGRAVINGS ON FULL-PAGE
PLATES, ILLUSTRATING MANNER OF
CONSTRUCTING NUMEROUS AND
IMPORTANT PATTERNS AND
CORE BOXES.

By **P. S. DINGEY,**

Practical Pattern Maker and Mechanical Draftsman.
376 Fine Illustrations: 12mo, cloth, \$2.

CONTENTS.

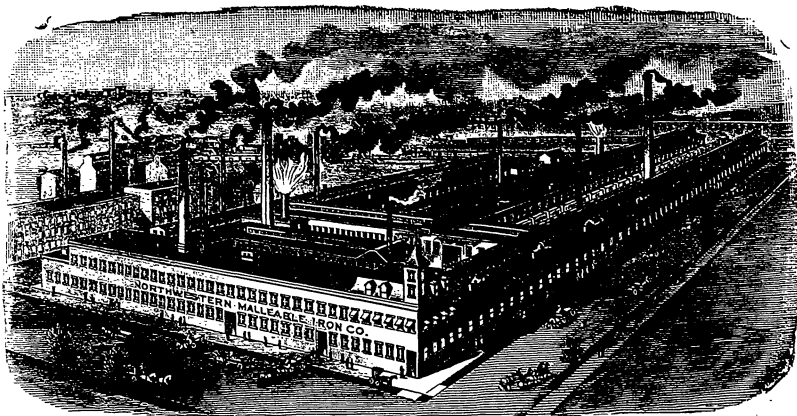
The Pattern Maker and His Trade.
The Pattern Shop—Its Position, Size and Requirements.
Marking and Recording Patterns.
Printing-Press Cylinders.
Differential Chain Pulleys.
A Handy Tool for Laying out Hexagon Nuts.
How to Cast Journal Boxes on Frames.
How to Strike an Arc by the Aid of Three Points.
Key-Heads for Motion Rods—The way to lessen the cost of their production.
Elbow and Tee Pipes—A quick method for turning the patterns and core boxes in the Lathe.
Slide-Valve Cylinders.
Corliss Cylinders—With a full description, showing how to construct patterns and core-boxes which can be changed at short notice for different stroke engines.
Fly Wheels—Different styles.
Engine Frames—How to build the pattern to serve for various strokes.
Spur Gears—How the teeth should be made.
Bevel Gears—The manner of laying them out.
How to Lay Out the Thread of a Worm for the Pattern.
Worm Wheels—The way to get the angle of teeth and the manner of fastening them on.
Sweeping Straight Winding Drums.
Making Winding Drums from Patterns—Method of cutting the groove.
Making Sheaves from Core Boxes.
Making Sheaves from Patterns.
Sheaves with Wrought-Iron Arms—An original way of making the Hub.
A Machine for Sweeping Conical Drums—Designed by the author.
Gear Teeth—One hundred and Twenty-eight full size different profiles of Gear Teeth from 1" to 3" Pitch, suitable for gears having from 14 to 800 teeth.
Table showing at a glance the required diameters of Gear Wheels for a given number of teeth and pitch.
Weight of Cast-Iron Pipe.
" " Cast-Iron Balls.
" " Round Cast Iron.
" " Square Cast Iron.
" " Flat Cast iron.
" " Superficial Foot of Cast Iron from 1/4" to 2" thick.
" " Round lead.
" " Square lead.
Binary and Decimal Fractions
Table which gives distances to open a 2-ft. rule for obtaining angles from 1° to 90°
Metric Measure reduced to inches.

Cost, Postpaid, on receipt of price, by

DAVID WILLIAMS, Bookseller & Publisher,

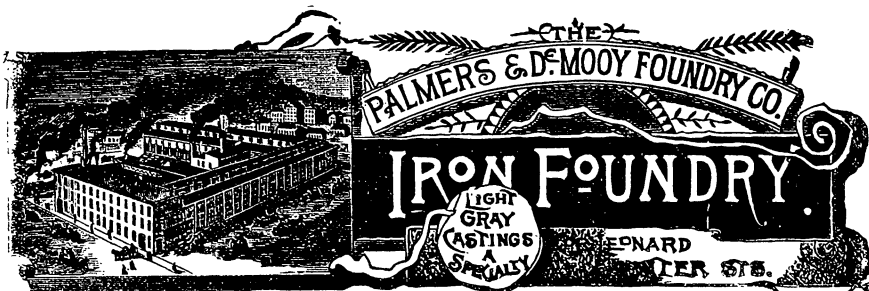
96-102 Reade Street, New York.

MALLEABLE IRON CASTINGS TO ORDER.



AGRICULTURAL, RAILROAD AND WAGON WORK.

**North-Western Malleable Iron Co.,
MILWAUKEE, WIS.**



Soft Castings for Electrical Work and Sewing Machines. Fine Light Gray Iron Castings. Metal Patterns designed and made. Also Japanning and Galvanizing.

CLEVELAND, O.

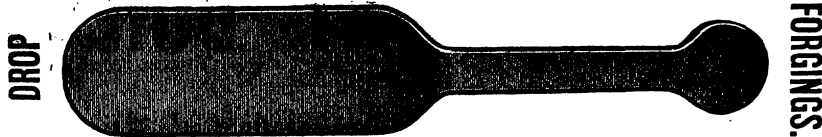
STEEL CASTINGS

FROM 1 to 40,000 POUNDS WEIGHT,
Of Open Hearth, Chester or Bessemer Steel.
True to Pattern. Sound. Solid.
Gearing of all kinds, Crank Shafts, Knuckles for Car Couplers.
Cross-Heads, Rockers, Piston-Heads, etc., for Locomotives.
Steel Castings of Every Description.
Chester Steel Castings Co.
Works, Chester, Pa. Office, 407 Library St., Philadelphia, Pa.

**THE ROBINSON-REA MFG. CO.,
PITTSBURGH, PA.**

**SAND AND CHILLED ROLLS.
TIN PLATE PLANTS COMPLETE.**

(No 5.)

WYMAN & GORDON, Worcester, Mass.

GRAY IRON, BRASS, ALUMINUM and ALUMINUM BRONZE CASTINGS
of the very best quality.

Very much time saved by using clean and soft castings. We use only the best material. A trial will convince you. **PICKETS and ROSETTES** for Wire Workers. Catalogue of same. **NICKEL PLATING and JAPANNING**, also **METAL PATTERN MAKING**. We invite correspondence.

HAIGHT & CLARK, - - ALBANY, N. Y.

DROP FORGINGS

Of Every Description, in Iron, Steel, Copper and Aluminum.

Hoist Hooks, Shafting Collars, Eye Bolts, Wrenches, Machine Handles, Fence Ornaments.

SPECIAL ATTENTION GIVEN TO THE MANUFACTURE OF
SPECIAL FORGINGS.

PHILADELPHIA DROP FORGE COMPANY,
Office and Works, S. E. Cor. American and York Sts., Philadelphia.

THE JOHNSON FOUNDRY CO.,
JOHNSTOWN, PA.
CHILLED AND SAND ROLLS.
GENERAL CASTINGS.

STANDARD FOUNDRY & MFG. CO., - CLEVELAND, OHIO
—HEADQUARTERS FOR—

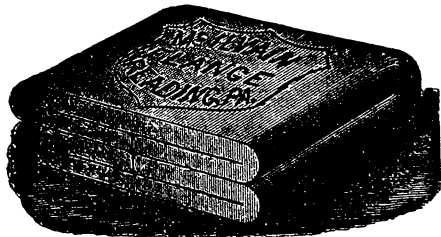
LIGHT GRAY IRON CASTINGS.

—UNEQUALED IN—

SOFTNESS and SUPERIOR FINISH.

Our Castings in finishing will save time and tools. We solicit a trial order knowing that we can please you. Send samples for prices.

TENSILE STRAIN. } 56,000 to 64,000 lbs.



CAPACITY. { Plates 1 inch thick to No. 12.
30 feet long.
70 inches wide.

WM. McILVAIN & SONS,
READING, PA.,
MANUFACTURERS OF

**IRON AND STEEL
BOILER PLATES.**

Locomotive, Fire Box, Flange, Shell, Tank Iron and Steel, including Plates for Bridges, Girders, Stacks, Pipe and Fire and Burglar-proof Safes.

THE ASCHMAN STEEL CASTING CO.,
MANUFACTURERS OF

Open Hearth Steel Castings of all Kinds.

Solid and Equal to Steel Forgings.

Send Sketch and Get Estimate.

Prompt Delivery.

OFFICE AND WORKS, SHARON, PA.

The Trenton Malleable Iron Company.

MALLEABLE CASTINGS

Made from Refined Air Furnace Iron.

SPECIALTIES: Malleable Iron Castings, Car Couplers, R. R. Supplies, Street Car R. R. Supplies, Car Replacers, Malleable Iron Castings for Contract Work, Frog and Switch Castings, Castings—Light and Heavy, Journal Box Castings, Car Trimmings.

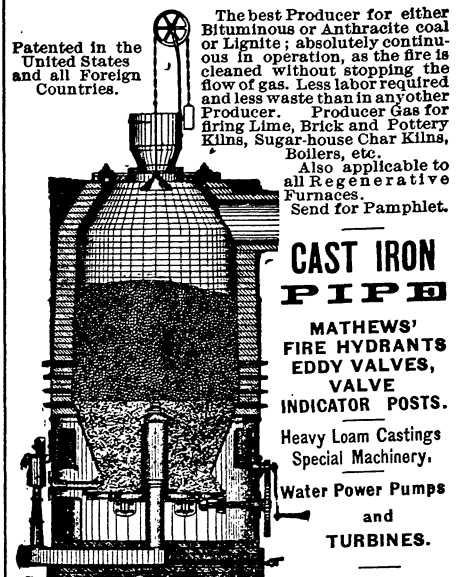
Prices given upon receipt of Patterns or Sample Castings.

Trenton - - - - - New Jersey.

R. D. Wood & Co. 400 Chestnut St. PHILADELPHIA.

SOLE MAKERS OF THE

**TAYLOR REVOLVING-BOTTOM
GAS PRODUCER.**



Patented in the United States and all Foreign Countries.

The best Producer for either Bituminous or Anthracite coal or Lignite; absolutely continuous in operation, as the fire is cleaned without stopping the flow of gas. Less labor required and less waste than in any other Producer. Producer Gas for firing Lime, Brick and Pottery Kilns, Sugar-house Char Kilns, Boilers, etc. Also applicable to all Regenerative Furnaces. Send for Pamphlet.

**CAST IRON
PIPE**

MATHEWS' FIRE HYDRANTS
EDDY VALVES,
VALVE INDICATOR POSTS.
Heavy Loam Castings
Special Machinery,
Water Power Pumps
and
TURBINES.

HYDRAULIC JIB and TRAVELING CRANES,
FREIGHT and CAR LIFTS, Etc.
GAS HOLDERS and GAS MACHINERY.

**A Trial will
Convince You**

— THAT WE MAKE —
**SOFT AND SMOOTH
Light Gray Iron Castings,**

- - SOUND - -

Brass and Bronze Castings

TRUE TO THE PATTERN.
Also HAVE FACILITIES FOR FINISHING.
Sample for estimate solicited.
I. S. SPENCER'S SONS, Guilford, Conn.

DONALDSON IRON COMPANY,

MANUFACTURERS OF



CAST IRON PIPE
And Special Castings for Water and Gas. Also Flange Pipe
Emaus, Lehigh Co., Pa.

FRANCIS WISTER,
COMMISSION MERCHANT,
COKE, COAL, ORES.

National Foundry Coke a Specialty.
Sulphur less than 0.5.

All sizes National Crushed Coke.

Bullitt Building, PHILADELPHIA.

FINE GRAY IRON

FRANKLIN IRON FOUNDRY,
The Burr and Houston Company
33-39 Franklin Street, Brooklyn (Greenpoint), N. Y.

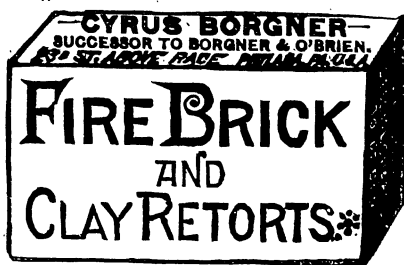
Special Attention Given to Fine Castings.
Telephone Call, Greenpoint 174.

HENRY AIKEN,

Consulting Mechanical Engineer,

Rooms 206, 208 Lewis Block,

PITTSBURGH, PA.



ESTABLISHED 1864.

JAMES GARDNER & SON,
MANUFACTURERS OF
"STANDARD SAVAGE" FIRE BRICK
TILE and FURNACE BLOCKS
OF ALL SHAPES AND SIZES.

WORKS, Ellerslie, Allegheny Co., Md.
OFFICE, Cumberland, Md.; P. O. Box 540.

S. M. Hamilton & Co., Agents, - Baltimore, Md.
Stowe, Fuller & Co., Agents, - Cleveland, O.

Established 1848.

OSTRANDER FIRE BRICK CO.
Manufacturers of
FIRE BRICK
FOR ALL PURPOSES
TROY, N. Y.

ESTABLISHED 1856

HENRY MAURER & SON,
MANUFACTURERS OF
FIRE BRICK
of all Shapes and Sizes,
420 E. 23d St. New York.

B. KREISCHER & SONS,
FIRE BRICK

BEST AND CHEAPEST,

ESTABLISHED 1845.

Office, foot of Houston Street, East River, NEW YORK

UNION MINING COMPANY
MOUNT SAVAGE FIRE BRICK.

Agent for Eastern Penna., West New Jersey and Delaware
EDWARD J. ETTING,
222 South Third St., Philadelphia, Pa.



The Practical Catechism. A collection of questions on technical subjects, by manufacturers and others, and of answers thereto. By ROBERT GRIMSHAW, M.E., Ph.D. Treating of Miscellaneous engineering questions, and touching upon physical science, chemistry, etc. GENERAL TOPICS: Properties of Air; Alloys; Beams; Belts; Bricks; Building; Building Stones; Calculations; Cements; Chemical Processes; Coloring Metallic Objects; Combustion; Disinfectants; Fastenings; Fluxes; Foods; Foundry Practice; Fuels; Gas; Gear Wheels; Gravity; Hardening; Tempering and Annealing; Heating; Hydraulics; Iron and Steel; Limes, Mortars and Cements; Locomotives; Lubrications; Mechanical Processes; Metals in General; Millwrighting; Paints; Oils and Varnishes; Plants; Power; Railways; Ropes; Saws; Shafting; Solders; Strength of Materials; Sugars; Temperatures; Timber and Trees; Ventilation; Waters; Weights; Wines; Work; Miscellaneous. 206 pages, cloth.....\$1.25

For Sale by DAVID WILLIAMS, 96-102 Reade St. N.Y.

THE GALLOWAY BOILER.

Safety, Maximum Economy in Fuel, Lowest Cost of Maintenance.
Greatest Durability, Large Steam and Water Spaces.

Are the Advantages Offered by this Boiler.

SPECIFICATIONS AND PRICES UPON APPLICATION TO

EDGE MOOR IRON COMPANY,

Post Office, Wilmington, Delaware.

WILLIAM SELLERS, Pres't.

JOHN SELLERS, Jr., Vice-Pres't.

H. B. BRADFORD, Sup't.

WM. F. SELLERS, Secretary.

WILLIAM H. CONNELL, Treasurer.

F. W. HEISLER, Purchasing Agent.



ESTABLISHED 1876.

THE SARGENT COMPANY

FORMERLY The Congdon Brake Shoe Co.

IRON & STEEL FOUNDERS

59TH & WALLACE STS. CHICAGO.

BRAKE SHOES-STEEL CASTINGS.

FRANKFORD STEEL COMPANY.

FRANKFORD, PHILA., PA.

Steel Railroad and Machine Forgings,

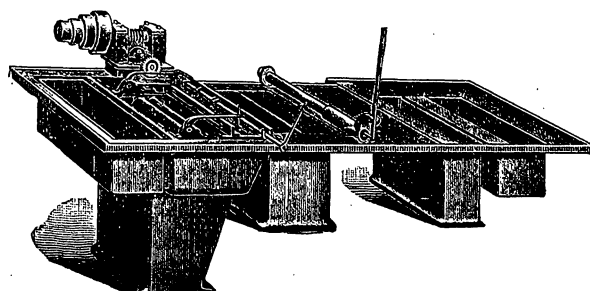
SOLID CRUCIBLE STEEL CASTINGS

Best Grades of Tool and Machinery Steel.

THE LLOYD BOOTH CO.,

YOUNGSTOWN, OHIO.

Tinning
MACHINERY.



Rolling Mills,
Sand and Chills
ROLLS.

THE S. Obermayer Co.,

FOUNDRY FACINGS, PLUMBAGO and
Manufacturers of FOUNDRY SUPPLIES, Importers of INDIA SILVER LEAD
FOUNDRY EQUIPMENTS. FOR ALL PURPOSES.
Selling Agents for BLAKENEY CUPOLA.

CINCINNATI, OHIO.

Send for Catalogue.

**Foundry
facings**

**Foundry
Supplies**

MANUFACTURERS,
J. W. PAXSON & CO.

Philadelphia, Pa.

GROUND SILICA ROCK,
FIRE BRICK,
FOUNDRY LADLES,
TUMBLING BARRELS.

CORE-COMPOUND.

PEERLESS FACING MILLS.

**Foundry Facings, Blackings and Foundry Supplies.
Iron and Brass Foundries Completely Equipped.**

**DIRECT IMPORTERS and REFINERS of GRAPHITE, SILVER
LEADS or PLUMBAGO.**

No Charge for Trial Samples.

Send for Illustrated Catalogue and Price-List.

THE CHICAGO FOUNDRY SUPPLY CO., CHICAGO, ILL.



3 or 4 Kinds

Of heavy bag facings, to say nothing of a core wash. That's what a great many foundries purchase. Our Radiant does it all. It's guaranteed to be a superior facing at a nominal price. Postal will bring you a sample. Write it.

**THE J. D. SMITH FOUNDRY SUPPLY CO.,
CINCINNATI, O.**

WESTERN FOUNDRYMEN, SAVE TIME, MAKE MONEY
Order Facings and Foundry Supplies from
The MacKellar Foundry Facing & Supply Co. Quincy, Ill

ECONOMICAL

DETROIT GRAPHITE MFG. CO.

GRAPHITE PAINT

DETROIT, MICHIGAN.

SEND FOR CIRCULARS.

DURABLE **INDESTRUCTIBLE**

THE ALLENTOWN ROLLING MILLS,

MANUFACTURERS OF

Fig Iron, Merchant Bar Iron, Rolled Shafting, Mine Rails, I-Beams, Tee Bars, Fish Plates, Bolts, Nuts and Spikes.

Transfer and Locomotive Turn Tables, Blast Furnace, Rolling Mill and Mining Machinery, Mining Pumps, Etc. Roll Trains, Shears, Punches, Iron Trucks, Etc. Builders of all classes of Machinery, Makers of Castings of all descriptions for Cable and Electric Railway.

ALLENTOWN, PA.

DROP FORGING.

ESTIMATES GIVEN ON APPLICATION.

Sole Manufacturers of Abtstrom's Patent Parallel Double

EXPANSION BOLTS,

also Single Expansion Bolts. Catalogues mailed on application

W. C. BOONE MFG. CO., - Office and Factory, - BOONTON, N. J.

THE IRON-FOUNDER:

A COMPREHENSIVE TREATISE ON

THE ART OF MOLDING,

INCLUDING CHAPTERS ON

CORE-MAKING; LOAM, DRY-SAND, AND GREEN SAND MOLDING; ALSO CRYSTALLIZATION. SHRINKAGE, AND CONTRACTION OF CAST IRON, AND A FULL EXPLANATION OF THE SCIENCE OF PRESSURES IN MOLDS; ADDED TO WHICH ARE FORMULAS FOR MIXTURES OF IRON, TABLES, RULES AND MISCELLANEOUS INFORMATION.

BY

SIMPSON BOLLAND,

Practical Molder and Manager of Foundries.

Illustrated with over Three Hundred Engravings.

12mo, Cloth, \$2.50.

Will be sent free on receipt of the price.

"Among the many recent additions to technical literature, we know of none of more practical value than **THE IRON-FOUNDER**. There are thousands of men in our foundries who will be greatly benefited by its 382 pages of interesting and valuable information."—*The Age of Steel*.

SENT, POSTPAID, ON RECEIPT OF PRICE, BY

DAVID WILLIAMS,

Publisher and Bookseller,

96-102 Reade St., New York.

The Iron-Masters' LABORATORY

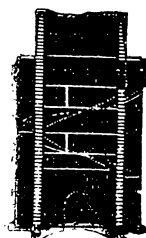
Exclusively for the
*Analysis of Ores of Iron Pig and Manu-
factured Iron, Steels, Limestone, Clays,
Slags and Coal for Practical
Metallurgical Purposes.*

Branch Office, 339 Walnut St., Philadelphia.
All Analytical Work at Warrenton, Virginia.
J. BLODGET BRITTON.

This laboratory was established in 1866, at the instance of a number of practical Iron Masters, expressly to afford prompt and reliable information upon the chemical composition of the substances above mentioned, for smelting and refining purposes, the object being to make it at once a convenient, practically useful, and comparatively inexpensive adjunct to the Furnace, Forge and Rolling Mill.

VICTOR COLLIAU,
Sole builder of his

New and Improved Patented



**HOT-BLAST
Colliau Cupola,**

287 Jefferson Ave.,
DETROIT, MICHIGAN,
U. S. A.

M. V. SMITH, PRES.
C. C. MORROW, SEC.

M. A. GREENE, VICE-PRES.
JOHN A. ELLIOTT, TREAS.

**Artificial Gas
Engineering Co.,**
Consulting and Contracting
ENGINEERS.

ARTIFICIAL GAS applied to all Branches
of Manufacturing and Domestic Uses.
Apparatus for the Manufacture of
Coal-Gas Furnished at Lowest Prices.

706 TIMES BUILDING,
PITTSBURGH, PA.

Patent Tumbling Barrels.

MANY VARIETIES

For all Kinds of Work.

Send for new Catalogue.

ANDERSON BROS., Waterbury, Conn.

Frank C. Roberts & Co.,
CIVIL ENGINEERS.

Blast Furnaces, Steel Works, Rolling
Mills, Iron and Steel Bridges and Build-
ings, Factory and Warehouse Construction

OFFICES:

S. E. Cor. 4th and Chestnut Sts., Philadelphia, Pa

EXHAUST TUMBLERS,

Hexagon, Round or Wooden
BEST AND CHEAPEST.

WM A. SWEETSER,

39 Montello St., Brockton, Mass.

JAMES HEMPHILL, President.
WM. H. CONLEY, Treasurer.

THOS. B. RITER, Vice-President.
JNO. F. WILCOX, Gen'l Manager.

PITTSBURGH IRON & STEEL ENGINEERING CO.

LEWIS BLOCK, PITTSBURGH, PA, U. S. A.

BESSEMER AND OPEN-HEARTH STEEL PLANTS.

Rolling Mills (Blooming, Rail Plate, &c) Blast Furnaces, Engines,
Boilers, Bridges, Girders, Iron Buildings.

WORKS BUILT COMPLETE and Fully Equipped for Operation.

**THE D. R. LEAN COMPANY,
ENGINEERS and CONTRACTORS,**

Penn Building, Pittsburgh, Pa.

Blast Furnace and Steel Plant construction. Regenerative
Gas Furnaces and Gas Producers.
Sole Agents **FORD & MONCUR'S** Fire Brick Stove, Machinery
and Castings, Iron Buildings, &c.

WILKIE, BOTHWELL & CO., Ltd.
Engineers and Contractors. ∴ Blast Furnaces and Steel Works.

We make a specialty of Repair Work, and can furnish a full line of Valves and Fittings
for Whitwell and Cowper-Kennedy Stoves.

606 Times Building, Pittsburgh, Pa.

Haines Gauge Co.,

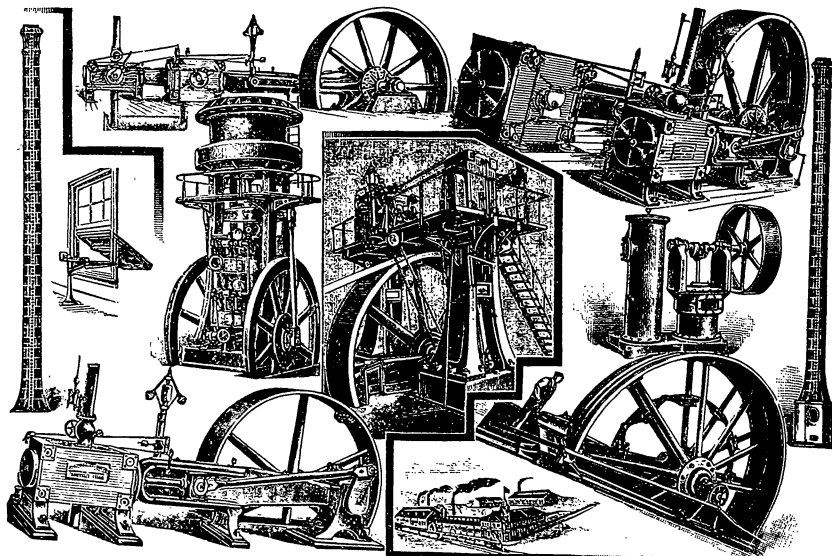
906 Filbert St.,

PHILADELPHIA,
PA., U. S. A.



The HAINES Automatic Micrometer Rolling
MILL GAUGE.
For reducing HOT WORK in process of rolling.

— PHILADELPHIA CORLISS ENGINES. —
AIR PUMPS AND CONDENSERS.
BAND AND FLY WHEELS. STEEL-PLATE CHIMNEYS.
— BLOWING ENGINES. —



BUILT BY

PHILADELPHIA ENGINEERING WORKS, LIMITED,
MIFFLIN STREET, EAST OF FRONT,
PHILADELPHIA, PA.

BOOKS

THE NEWEST BOOKS ON Metal Working, Iron, Steel and
Metallurgy; Mining, Mechanical and Civil Engineering; Casting and
Founding; Electricity and Electric Lighting; Draftsmanship,
Architecture and Building, promptly supplied on receipt of price.
SEND FOR CATALOGUES, mentioning the kind of books
you are looking for.

DAVID WILLIAMS, 96-102 Reade St., New York.

THE S. R. SMYTHE COMPANY, INCORPORATED.

LEWIS BLOCK, ENGINEERS AND CONTRACTORS. PITTSBURGH, PA.

**Regenerative Gas Furnaces and Gas Producers
For All Purposes.**

TUBE, STEEL, ROLLING MILLS, GLASS WORKS CONSTRUCTION, Etc.

We contract for complete Plants, guarantee results and satisfactory operation of same.

OVER 100 PLANTS IN SUCCESSFUL OPERATION.**JULIAN KENNEDY.****Consulting and Contracting Engineer,**

Rooms 36, 37, 38, 39 Vandergrift Building, Pittsburgh, Pa.

Blast Furnaces, Bessemer and Open Hearth Steel Works, Rolling Mills.

STEAM AND HYDRAULIC MACHINERY, &c.

—Branch Office of The Latrobe Steel Works.—

Wm. Swindell & Bros.,

ENGINEERS AND CONTRACTORS,

**Regenerative and Recuperative Gas Furnaces for
Steel, Iron and Glass.****SWINDELL'S IMPROVED GAS PRODUCERS,**

243 BUILT SINCE APRIL 1, 1891.

P. O. Box 945.

548 Smithfield St., Pittsburgh, Pa.

ALEX LAUGHLIN & CO.

LEWIS BLOCK, PITTSBURGH, PA.

GAS HEATING
GAS PUDDLING
CRUCIBLE
OPEN HEARTH
TUBE WELDING**FURNACES**AND ARTIFICIAL GAS PRODUCERS OF EVERY
DESCRIPTION, FOR ROLLING MILLS, STEEL AND TUBE WORKS.
We guarantee to place all plants erected by us in successful operation.**J. A. HERRICK, M. E.,****Consulting Engineer and Contractor.**

Room 609, 284 Pearl Street, NEW YORK.

—**STEEL CASTING PLANTS A SPECIALTY.**—

Melting and Heating Furnaces of ALL KINDS.

Patent Gas WATER VALVES. Improved "BASIC" and "SEMI-STEEL" Processes and FURNACES.

New CONTINUOUS Gas PRODUCERS.

HENRY J. CARTEN,

ENGINEER AND CONTRACTOR,

REGENERATIVE GAS FURNACES AND ARTIFICIAL GAS PRODUCERS,

Room 15, Stevenson Building, Pittsburgh, Pa.,

Special attention given to Gas producer plants not working satisfactorily.

CORRESPONDENCE SOLICITED.**OIL WELL SUPPLY COMPANY**

OWNERS OF THE

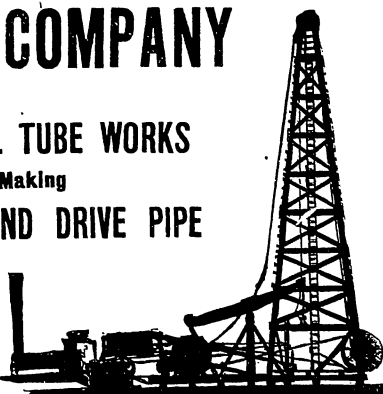
ELBA IRON WORKS, CONTINENTAL TUBE WORKS

And Six Other Manufactories Making

WROUGHT IRON STEAM, LINE AND DRIVE PIPETubing, Casing, Boilers, Engines, Drilling Rigs,
Tools, Rope,And all other appliances necessary for drilling Oil, Gas
and Water ARTESIAN WELLS.

PITTSBURGH, OIL CITY AND BRADFORD, PA.

Also 32 CORTLANDT STREET, NEW YORK

**McCLURE, AMSLER & CO.,****Engineers and Contractors,**

Bissel Block, Pittsburgh, Pa.

BLAST FURNACE CONSTRUCTION**A SPECIALTY.**

General Agents for Massick's and Crooke's Patent Fire Brick Stoves; Designs and Estimates for the construction of Blast Furnace Work, and for all kinds of Hot Blast Fire Brick or Pipe Stoves; and all other kinds of Brick Work pertaining to Steel Plants, Iron, Brick or Wooden Buildings, all kinds of Iron Construction in general.

We propose to put into successful operation all the plants we design and contract for.**Detroit Foundry Equipment
Co.****Cranes****CUPOLAS,
LADLES,
TRUCKS,
TUMBLERS.**Whiting's Improved
Car Wheel Plant.CHICAGO,
702-708 Temple Court.
225 Dearborn St.DETROIT,
Mich. Ave. & D. & B. C. Ry
225 Dearborn St.**ELEMENTS OF COST.**

By Frederick W. Child.

20 PAGES,

5 x 7 1/4 Inches.

Paper, 25 cents.

An address to the Institute of Accounts, New York, of which the writer is a member, put in form to assist those in charge of manufacturing accounts. Practical forms are included for a series of order books, examples of foreman's order, form of pay-roll, quarter-time book, job time book, form of summary, charges book, summary of costs, material, labor, cash, expense, manufacturing and improvement acts, store-room, iron foundry, brass foundry.

Sent, post-paid, upon receipt of price, by

DAVID WILLIAMS, Publisher and Bookseller,

86-102 Reade Street, New York

ZUCKER & LEVETT CHEMICAL CO.,
10, 12 & 14 Grand Street, New York, U. S. A.

NICKEL PLATING OUTFITS,

Dynamos and Motors for Light, Power and Electro-plating.

Send for Catalogue of
NICKEL AND ELECTRO-PLATING SUPPLIES AND POLISHING MATERIAL.

ROLL

LATHES.

TRETHEWEY MFG. CO., - 47th ST., PITTSBURGH, PA.,

MANUFACTURERS OF

Roll Lathes, Hardened Forged Steel Rolls, Roll Turning Tools, Solid Steel Shear Knives, Tool Steel Dies of any size. Forgings of Machinery or Tool Steel, Rolling Mill Machinery, Steam Hammers, Squaring Shears, Double Headed Rotary Shears, Shear Grinding Machinery, Circle Cutting Machines.

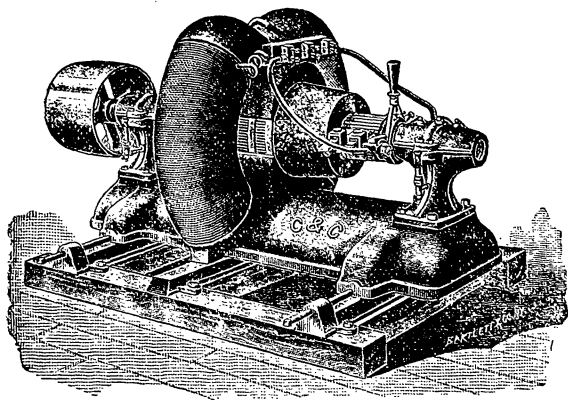
C. & C. ELECTRIC MOTORS AND DYNAMOS

Highest Electrical Efficiency.

Best Mechanical Construction.

Electric Pumps, Hoists, Fans, Blowers, Etc.

Large experience in and special attention paid to electrical transmission of power in factories.



THE C. & C. ELECTRIC MOTOR CO.

GENERAL OFFICES:

402 and 404 Greenwich St., New York.

BRANCH OFFICES:

CHICAGO,
201 Madison Street.

BOSTON,
63 Oliver Street.

AGENCIES IN ALL PRINCIPAL CITIES.

**CHAPMAN VALVE
MFG. CO.**

Manufacturers of

VALVES & GATES

For Water, Steam, Gas,
Ammonia, &c.

GATE FIRE HYDRANTS,
With and without independent outlets.

We make a specialty of Valves with Bronze seats for High Pressure steam.

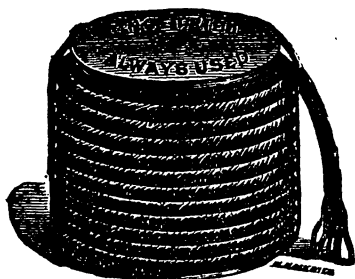
Works and General Office,

INDIAN ORCHARD, MASS.

Treasurer's Office,

72 Kilby and 112 Milk Streets,

Boston, Mass.



Send for a Sample of
Morrison's Patent Self-Lubricating Packing.

ROBT. MORRISON,

6034 Arsenal St.,

St. Louis, Mo

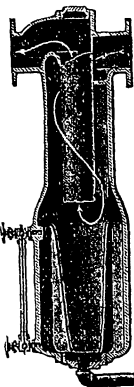
JAMES P. WITHEROW CO.,

SHOPS: New Castle, Pa.

GENERAL OFFICES: Times Building, Pittsburgh, Pa.

ENGINEERS, CONTRACTORS, &c.

JAMES P. WITHEROW, General Manager.



TO OBTAIN DRY STEAM

PLACE A

STRATTON SEPARATOR

In Your Steam Pipe.

Over 400,000 Horse Power in use.

This is the only apparatus that automatically separates water from steam, and secures the maximum of Economy, Efficiency and Safety. These Separators are used by the U. S. Navy, by the leading Electric Light Cos., Sugar Refineries, Paper Mills, Water Works, Railroads and Steam Vessels. Steam Chimneys or Drums are unnecessary when this Separator is used.

Send for our new publication, "Dry Steam the Foundation of Economy." Sent free on application.

The GOUBERT MFG. CO., Sole Mfrs.,

32 Cortlandt St.,
New York.



THE GARTLAND FOUNDRY CO.,

MANUFACTURERS OF

Light Work our

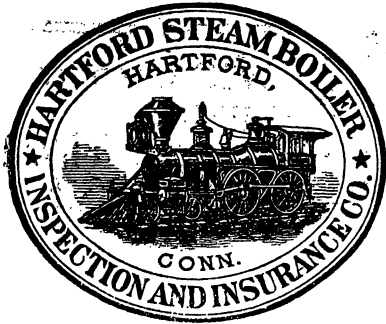
Specialty.

Soft Grey Iron Castings.

We are prepared
to do Japanning and
Galvanizing.

UNION and ECHO STS.,
Cleveland, Canton & Southern R. R.,

CLEVELAND, O.



THOROUGH INSPECTIONS

And Insurance against loss or damage to property and loss of life and injury to persons caused by

Steam Boiler Explosions

J. M. ALLEN, Pres. WM. B. FRANKLIN, Vice-Pres. F. B. ALLEN, 2d Vice-Pres. J. B. PIERCE, Sec. and Treas

BOARD OF DIRECTORS:

J. M. ALLEN, President.
FRANK W. CHENEY, of Cheney Brothers Silk Manufacturing Co.
CHARLES M. BEACH, of Beach & Co.
DANIEL PHILLIPS, of Adams Express Company.
RICHARD W. H. JARVIS, President Colt's Fire Arms Manufacturing Co.
THOMAS O. ENDERS, of the United States Bank.
LEVERETT BRAINARD, of the Case, Lockwood & Brainard Co.
GEN. WM. B. FRANKLIN, late Vice-President Colt's Pat. Fire Arms Mfg. Co.
NELSON HOLLISTER, of the State Bank, Hartford.

HON. HENRY C. ROBINSON, Attorney at Law, Hartford.
HON. FRANCIS B. COOLEY, of the National Exchange Bank, Hartford, Conn.
A. W. JILLSON, late Vice-Prest. Phoenix Fire Insurance Co., Hartford, Conn.
EDMUND A. STEADMAN, President of the Fidelity Co., Hartford, Conn.
GEORGE BURNHAM, Baldwin Locomotive Works, Philadelphia.
HON. NATHANIEL SHIPMAN, Judge U. S. Circuit Court.
C. C. KIMBALL, Prest. Smythe Manufacturing Co., Hartford, Conn.
PHILIP CORBIN, of P. & F. Corbin, New Britain, Conn.

HAVE YOU EXHAUST STEAM GOING TO WASTE ?

Are your FEED WATER HEATERS obtaining the best results, in heating and purifying the feed water for your boilers? Are you heating your buildings with live steam or exhaust?

IF YOU DESIRE TO GET BETTER RESULTS from your present feed water heaters, and to heat your building by exhaust steam, without back pressure upon engines, saving power and water of condensation, together with **GREATER ECONOMY IN FUEL**, send for our catalogues of **Webster Vacuum Feed Water Heater and Purifier**, and **Williames Vacuum System of Steam Heating**, which contains some of the largest plants in the United States as references. We visit plants in any part of the United States, at our expense, furnish our apparatus, which may be attached to your present plant, upon trial, under guarantee.

Patentees, Proprietors and Manufacturers of the
Webster Vacuum Feed Water Heater and Purifier.
SEND FOR CATALOGUE.

WARREN WEBSTER & CO.,

Managers and Sole Licensees for the Sale of Patent Rights in the United States.

Main Office and Works, 491 N. 3d St., PHILADELPHIA.

GLOBE PACKING.

FOR STEAM ENGINES, PISTON RODS
MINING PUMPS,
HYDRAULIC LIFTS. ICE MACHINES, ETC.

None genuine without this TRADE-MARK on the MUSLIN cover.

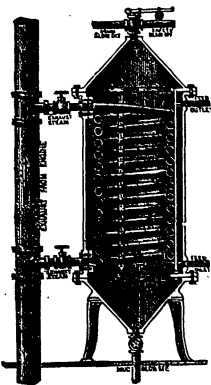


AGENCIES:

The Burnet Co., New York; W. D. Allen & Co., Chicago; Ensign & McGuffee, San Francisco; T. K. Carey & Bro., Baltimore; Charlotte Supply Co., Charlotte; Waters & Garland, Louisville; Southern R. & Supply Co., Richmond, and others

Ask your supply dealers for it or order from agencies or from makers,

JAS. H. BILLINGTON & CO.
PHILADELPHIA, PA.



THE AMERICAN FEED WATER HEATER

Received the First Prize at the

Mechanics' Association Fair, - Boston, Mass.

What you get when you buy the AMERICAN HEATERS:

COPPER COILS,
SOLIDLY BRAZED,
GUN METAL FITTINGS
AND CLAMP STAYS,
STEEL SHELLS,

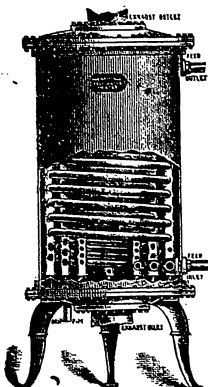
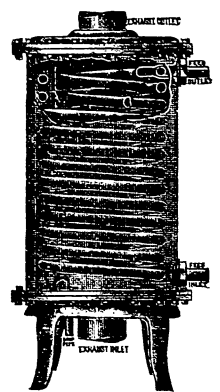
NO RUSTING OUT,
NO LEAKY JOINTS,
NO TROUBLE FROM EXPANSION,
NO BACK PRESSURE,
NO OIL IN BOILER.

We guarantee this Heater to be the Most Durable, Effective and Cheapest.

WHITLOCK COIL PIPE CO.,

27 South Street,

Elmwood, Conn.



The National Feed Water Heater

is a BRASS COIL HEATER, delivering water to the boilers at 212° Fahrenheit. It is low in price, but unequalled in efficiency. 500,000 H. P. in daily use attests its merits.

Coils and Bends of Iron, Brass, and Copper Pipe.

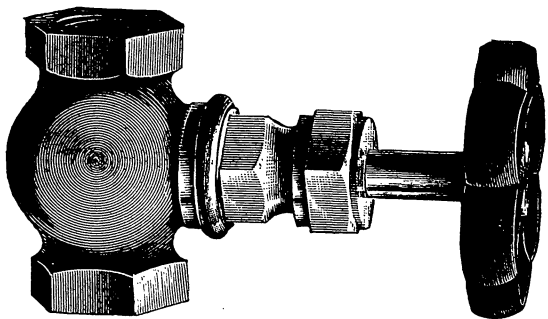
THE NATIONAL PIPE BENDING CO.,
98 River St., New Haven, Conn.



**BLAST FURNACES,
ROLLING MILLS,
STEEL WORKS,
MINES, ETC.,
ETC.**



**OIL WELLS,
REFINERIES,
ELECTRIC LIGHT PLANTS
WATER WORKS, ETC.,
ETC.**



McNAB & HARLIN MFG. CO.,
—MANUFACTURERS OF—
BRASS COCKS AND VALVES
For Steam, Water and Gas.

Wrought Iron Pipe and Fittings. Plumbers' Materials. Seamless Brass and Copper Tubes.

Factory, PATERSON, N. J.

56 JOHN ST., N. Y.

Catalogue and Price-List will be sent to the Trade with their first order, or by express, if desired, before ordering.



THE CONTINENTAL IRON WORKS.

West and Calyer Streets, BROOKLYN, N. Y.,

—SOLE MANUFACTURERS OF—

CORRUGATED FURNACES, FOR MARINE AND LAND BOILERS.

Made in sizes from 28 in. to 60 in. diameter, with flanged or plain ends.

Take Ferry from East 10th or 98d Streets, N. Y., to Greenpoint.

Thos. F. Rowland, Pres.
Thos. F. Rowland, Jr., Treas.

Warren E. Hill,
Chas. H. Corbett, } Vice-Pres.

AUTOMATIC REGISTER.

The most accurate and reliable counter manufactured. Made entirely of metal.



Handsomely finished. Can be used on any machine. Send for circular.

G. EDW. OSBORN & CO.,
391, 393 & 395 State St., New Haven, Conn

DURANT COUNTING MACHINES.



Send for

Catalogue

to

W. N. DURANT, 234 22d St., Milwaukee, Wis.,
Exhibit in Gallery, Manufactures Building,
World's Columbian Exposition, Section
E, Col. T-108 and active exhibit in Machinery
Hall.

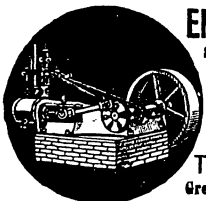
ENGINES & BOILERS

Stationary & Semi-Portable.
8 to 25 HORSE-POWER.
High in Grade.

Low in Price

Send for Pamphlet.

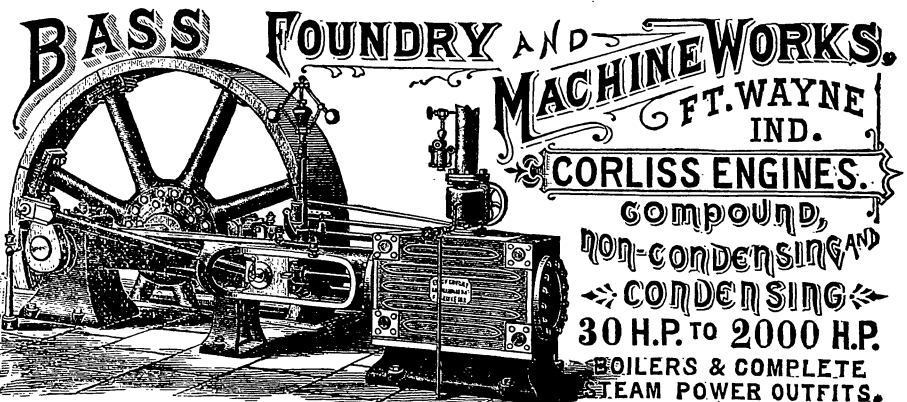
The W. C. LEFFEL CO.
Greenmead Ave., Springfield, O.



BEVEL GEARS

PLANE PERFECTLY BY PATENTED PROCESS

GLEASON TOOL CO.
ROCHESTER, N. Y.



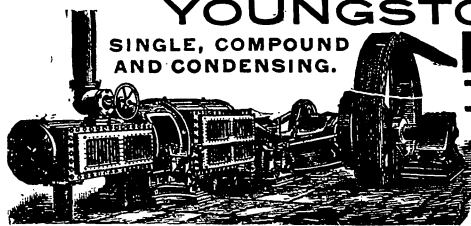
WILLIAM TOD & CO.

YOUNGSTOWN, OHIO.

SINGLE, COMPOUND
AND CONDENSING.

**PORTER-HAMILTON
ENGINE**

Blowing Engines,
Hydraulic Cranes & Accumulators
Heavy Special Machinery.
ENGINE CATALOGUE ON APPLICATION.



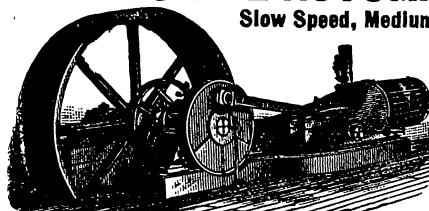
THE BUCKEYE AUTOMATIC CUT-OFF ENGINES.

Slow Speed, Medium Speed and High Speed Engines.

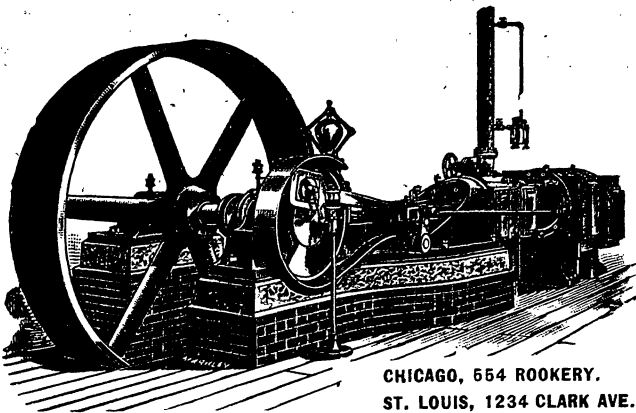
Simple, Compound and Triple Expansion
Engines, High Pressure Boilers.

Complete Steam Power Plants of
Highest Attainable Efficiency.

Address **BUCKEYE ENGINE CO., Salem, Ohio**



H. T. Porter, No. 10 Telephone Building, New York City. A. A. Hunting, John Hancock Building,
Boston, Mass. N. W. Robinson, No. 97 Washington St., Chicago. Robinson & Cary Co., St. Paul, Minn.
A. L. Fish, No. 61 First Street, San Francisco, Cal. A. M. Morse, 511 Commercial Building, St. Louis, Mo.



SOUTHWARK FOUNDRY AND MACHINE CO.

Philadelphia, Pa.

Sole Makers of

**THE PORTER-ALLEN
AUTOMATIC ENGINE**
SIMPLE, COMPOUND
OR TRIPLE EXPANSION

Also Builders of

**BLOWING ENGINES,
REVERSING ENGINES,
CENTRIFUGAL PUMPS,
BOILERS, TANKS, ETC**

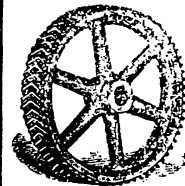
CHICAGO, 554 ROOKERY.
ST. LOUIS, 1234 CLARK AVE.

Look

Alive!

—watch your interests—do that and you will be successful. It pays to watch the little things. Gearing is a little thing but it amounts to a great deal. Get our Machine Molded gear wheels made from Special Process charcoal iron, and you will have gotten the best.

UNION FOUNDRY & MACHINE CO.,
Pittsburgh, Pa.



POWER FROM GASOLINE.

DIRECT FROM THE TANK.

CHEAPER THAN STEAM.

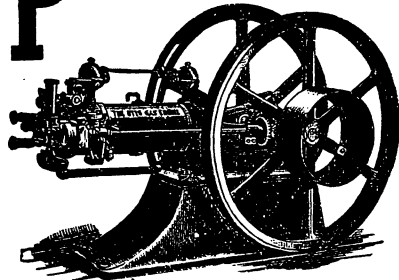
No Boiler. No Steam. No Engineer.

For Use Everywhere.

OTTO GASOLINE ENGINES.

Stationary or Portable.

1 to 50 H. P. 8 to 20 H. P



Running Expenses, Less than one cent per horse power per hour.

For large engines, one-half cent per horse power per hour.

Suitable for all manufacturing purposes, Electric Lighting, Town Water Supply.

The Best Auxiliary Power for Night Work.

OTTO GAS ENGINE WORKS,

33d and Walnut Sts.,
PHILADELPHIA, PA.

CHICAGO OFFICE:
245 Lake St.

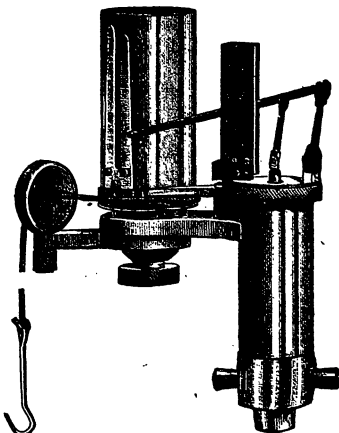
BOSTON OFFICE:
19 Pearl St.

E. L. MAXWELL, Pres. C. A. MOORE, Vice-Pres. H. S. MANNING, Treas. M. LUSCOMB, Sec

THE ASHCROFT MANUFACTURING COMPANY

SOLE MANUFACTURERS OF

THE TABOR STEAM ENGINE INDICATOR.



The only instrument that will make accurate diagrams at either high or low speeds. In use all over the World where accuracy is desired. Approved and adopted by United States Government on the new Cruisers.

Use the Coffin Averaging Instrument; determines the area of any irregular figure. Gives mean effective pressure (M. E. P.) of an indicator diagram without computation. Absolute accuracy. Easy to manipulate. No liability to error. One diagram per minute measured without effort.

Also Steam and Vacuum Gauges, with Patent Seamless Drawn Tube, Steam Traps, Packer Ratchet Drills, Stainwood Cutters, Marine Clocks, Engine Revolution Counters, Test Gauges, Oil Cups, Test Pumps, Locomotive Spring Balances, Steam Whistles, Salinometers, and all instruments for Measuring Steam, Air, Gas, or Water

Office and Salesroom, 411 Liberty St., N. Y.

Factory, Bridgeport, Conn.

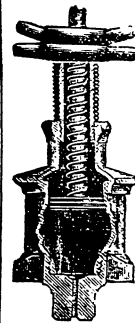
Address all Letters to P. O. Box 3754, New York.

Exhibit at World's Columbian Exposition, Section No. 25 Columns K. 24 and 25, Main Center Aisle, Machinery Hall.

WADHAM'S OIL AND GREASE CO., Milwaukee, Wis.,

Manufacturers of

Fine Lubricants and Compression Grease Cups.



Sole manufacturers of the O'CONNELL GREASER. The most reliable lubricator in existence for the Crank Pin and Cross Head. It saves 50 per cent. of the cost of using oil and effectually prevents hot journals. Special cups made for

upright MARINE ENGINES. Write for Descriptive Catalogue and Prices.

WELL MACH'Y

All Kinds, Water, Gas, Oil Mining, Ditching, Pumping, Wind and Steam; Heating Boilers, &c. Will pay you to send 25c. for Encyclopedia of 1500 Engravings.

The American Well Works, Aurora, Ill. Also Chicago, Ill.; Dallas, Tex.; Sydney, N. S. W.

BOSTON GEAR WORKS

37 Hartford St., Boston, Mass.

HEADQUARTERS FOR GEARS.

Book on Gears, 170 Illustrations, \$1.00. Job Gear Cutting of all kinds. Spur, Bevel, Spiral, Ratchet, Worm, Rack, Elliptic, Index Plates, &c. Very small or large. Send for 1892 Catalogue; 900 sizes of Gear; FREE to any business firm.

ROLLASON GAS ENGINES

RELIABLE AND ECONOMICAL
Send for Catalogue, etc. HAVENEM, BLDG. NEW YORK



The Shipman Automatic Steam Engine. PETROLEUM OR KEROSENE FUEL.

1, 2, 6, 8 Horse-Power, Single,
8 and 22 " " Compound.

STATIONARY or MARINE.

No SKILLED ENGINEER

—SEND FOR CATALOGUE—

SHIPMAN ENGINE CO.,

200 Summer St., Boston, Mass.

New Orleans

New York

Chicago

San Francisco

Books for Assayers

The Assayer's Manual.

An abridged treatise on the docimastic examination of ores and furnace and other artificial products. By BRUNO KERL; from the German by W. T. BRANN; second American edition, edited, with additions, by F. LYNWOOD GARRISON; 354 pages, illustrated cloth.....\$3

Notes on the Chemistry of Iron.

For professional men, students, iron and steel merchants and all interested in iron. Explaining the methods of analysis, and how to apply the results obtained. Third edition, revised and enlarged. By MAGNUS TROILTUS; 143 pages; cloth.....\$2

System of Quantitative Chemical Analysis.

Edited by PROF. O. D. ALLEN, assisted by PROF. S. W. JOHNSON. Revised and corrected by DR. C. R. FRESSENIUS; 883 pages; cloth.....\$6

Manual of Qualitative Chemical Analysis.

Translated into the new system and newly revised by Samuel W. Johnson, M. A. Ninth edition. By DR. C. R. FRESSENIUS. 500 pages; cloth.....\$4

Quantitative Chemical Analysis by Electrolysis According to Original Methods.

Authorized translation from the German of Dr. Alex. Classon. By PROF. WM. HALE HERRICK. Teaching electrolytic methods, useful in laboratories for research, and in technical laboratories, especially those connected with metallurgical works. Cloth.....\$2.50

The Blowpipe in Chemistry, Mineralogy, and Geology.

Containing all known methods of anhydrous analysis, many working examples, and instructions for making apparatus. By LIEUT.-COLONEL W. A. ROSS, R.A., F.G.S. With 120 illustrations; 214 pages; cloth.....\$2

The Art of Electrolytic Separation of Metals.

Theoretical and Practical. By G. GORE. Fully illustrated; 8vo, cloth.....\$3.50

A Text Book of Assaying;

for the use of students, mine managers, assayers, &c. By J. J. and S. C. BERNER. 400 page diagrams; cloth.....\$3.25

Exercises in Quantitative Chemical Analysis.

With a short treatise on gas analysis. By W. DITTMAR.....\$4.25

The Chemistry of Iron and Steel Making, and of their Practical Uses.

Written with the object of supplying to the producers and distributors of iron and steel, and to engineers, shipbuilders, architects and others concerned in the use of these important materials, the special scientific knowledge which they all should possess in simple, clear and readable language, the inevitable technicalities being explained as they occur. By U. MATTIEU WILLIAMS, F.C.S., F.R.A.S. Crown 8vo, cloth extra.....\$3

Any book published sent, postpaid, on receipt of price, by

DAVID WILLIAMS,

Publisher and Bookseller,

26-102 Reade Street, New York

The PHOENIX IRON WORKS COMPANY, Meadville, Pa., respectfully invites

YOU

to call and see their exhibit of "DICK & CHURCH" high speed engines, World's Columbian Exposition, Chicago, Ill., Machinery Department Building, Section C, Column No. 7.

One Single Cylinder Engine of 250 H.-P.
One Tandem Compound Engine of 250 H.-P.
One Triple Expansion Engine of 500 H.-P.

Awarded the Grand Prize at Late Paris Exposition.

SEND FOR THIS BOOK

FREE ON APPLICATION.

THE BABCOCK & WILCOX CO. ST. N.Y.

30 CORTLANDT ST. N.Y.

BRANCH OFFICES:

BOSTON, MASS. 8 OLIVER ST.
PHILADELPHIA, PA. 32 N. 5TH ST.
PITTSBURGH, PA. 408 LEWIS BLOCK
CLEVELAND, O. 412 PERRY-PAYNE BLDG.
CHICAGO, ILL. 45 S. JEFFERSON ST.
MINNEAPOLIS, MINN. 604 CORN EX.
NEW ORLEANS, LA. 57 CARondelet ST.
HAVANA, CUBA. 116 1/2 CALLE DE LA HABANA.

WATER TUBE STEAMBOILERS

MANUFACTORIES IN UNITED STATES, SCOTLAND, FRANCE, GERMANY & AUSTRIA.

POOLE & SON CO.

BRASS ROLLING MACHINES
SHAFTING, PULLEYS
POOLE-LEFFEL
CABLE DRIVING MACHINERY
WATER-WHEEL
GEARINGS
BALTIMORE, MD. U.S.A.

ROCK DRILLING AND AIR COMPRESSING

MACHINERY

—FOR—

TUNNELS, QUARRIES,

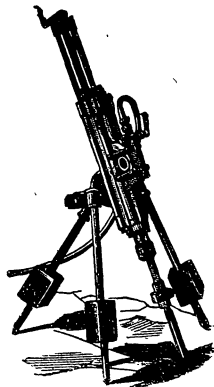
MINES, RAILROADS,

And wherever Ore and Rock are to be Drilled and Blasted.

RAND DRILL CO.,

23 Park Place, New York.

Branch Offices: Monadnock Building, Chicago; Ishpeming, Mich.; 1316 18th Street, Denver; Sherbrooke, P. Q., Canada; Apartado 830, Mexico City.



IRON CASTINGS of all kinds to order.

Drill Press and PLANER CHUCKS

UNIVERSAL PORTABLE RADIAL DRILLS. HIGH PRESSURE VERTICAL ENGINES. HORIZONTAL STATIONARY ENGINES.

CRANES, Hand and Power, Steam and Hydraulic.

Diamond Pointed Core PROSPECTING DRILLS.

Can Turn 22 Feet Diameter.

MACHINERY of all kinds built to order.

MINERAL LANDS PROSPECTED and Artesian Wells Bored, by Contract.

PENNSYLVANIA DIAMOND DRILL & MANUFACTURING CO. - BIRDSBORO, PA.

CHICAGO MACHINERY & ENGINEERING CO., Western Sales Agents. Chicago, Ill.

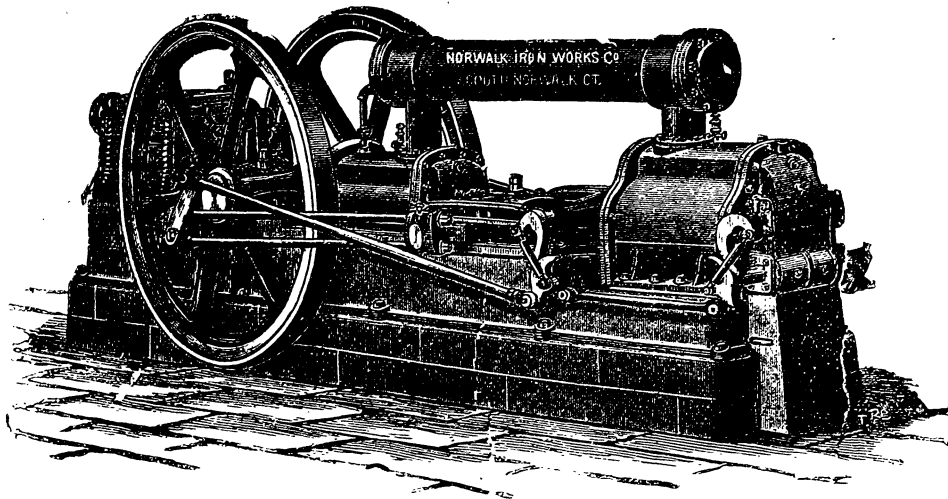
CLEVELAND AND HARDWICK

ERIE ENGINE WORKS.

MANUFACTURERS OF STEAM ENGINES and BOILERS.

ERIE, PENN.

Air Compressors.



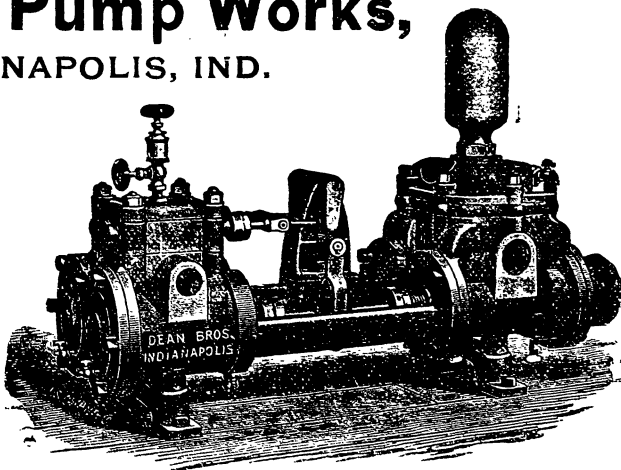
THE NORWALK IRON WORKS CO., South Norwalk, Conn.

DEAN BROTHERS
Steam Pump Works,
 INDIANAPOLIS, IND.

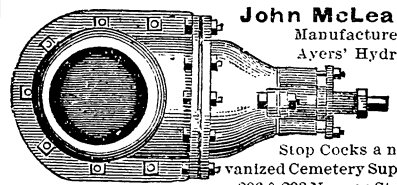
DUPLEX PUMPS.

SINGLE PUMPS.

DEEP WELL
 PUMPS.



Send for Catalogue
 and Prices.



John McLean,
 Manufacturer of
 Ayers' Hydrants.

Stop Cocks and Ga-
 vanized Cemetery Supplies
 296 & 298 Monroe St., N.Y.

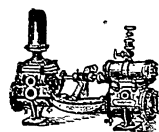


**CHEAPEST.
 HANDIEST.
 SIMPLEST.**

PUMPS.

Handling Dirty, Gritty and Sandy Liquids,
 without Wear, Oil or Care. Pumping outfits
 for Contractors, Mining, Irrigating, Railroad,
 Quarry, Drainage and Manufacturing purposes.
 Second-hand Engines, Boilers, Pumps, and
 other Machinery always on hand. Exchanging.

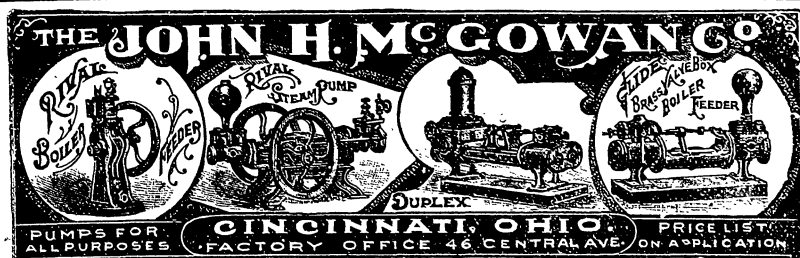
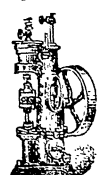
**MASLINS, 165-167 First St
 Jersey City, N.J.**



Send
 for
 Prices.



VALLEY PUMP CO.
 Easthampton, Mass.



Brass Founders and Mfrs. of every description of Brass and Iron body goods for steam, gas and water.

Worthington Steam Pumps
CONDENSERS and WATER METERS.

HENRY R. WORTHINGTON,

86 & 88 LIBERTY STREET, NEW YORK.

BOSTON, ST. LOUIS, PHILADELPHIA, DENVER. CHICAGO

The WATERBURY-FARREL FOUNDRY & MACHINE CO., Waterbury, Connecticut,

Builders of Rolling Mill Machinery, Special Machines for finishing and making goods from
 Sheet Brass, Copper, Steel, Silver, &c.; **POWER PRESSES, HYDRAULIC PRESSES,**
 Drop Presses, Foot Presses, **RIVET MACHINES,** Gang Slitters, Grinding Machines, Steel
 Rolls, Wire Mill Machinery, Tube Drawing Machinery, Dies, &c.

SEAMLESS

COPPER FLOATS

AND

AIR CHAMBERS.

to stand 50%

more pressure than any other make.

SEND FOR PRICES.

SPRINGFIELD BRASS CO.,

SPRINGFIELD, MASS.

Made in all sizes

and shapes by a

New

Process.

Guaranteed

to stand 50%

The Brown Hoisting and Conveying Machine Co.,

CLEVELAND, OHIO, U. S. A.,

Sole manufacturers of the

"BROWN HOIST"

A NEW AND COMPLETE SYSTEM FOR HANDLING OF MATERIALS.

The Brown Patent Cable Tramway system.

The Brown Patent Suspended Beam Tramway system.

The Brown Patent Bridge Tramway system.

The Brown Patent Shed Tramway system.

The Brown Patent Furnace Stock Distributer.

The Brown Patent Warehouse Tramway system.

The Brown Patent Sewer Machine Tramway system.

The Brown Patent Continuous Elevated Tramway system.

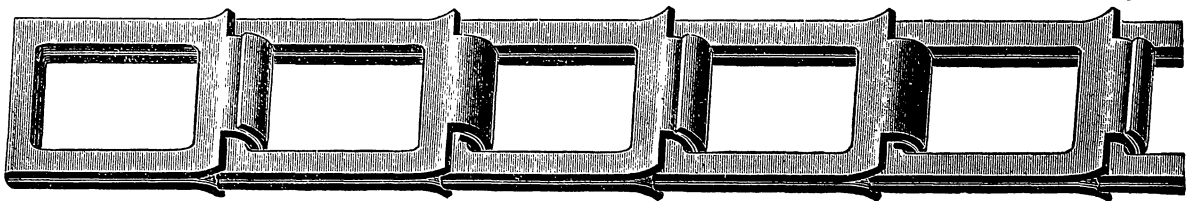
The Fayette-Brown Patent Automatic Furnace Hoist.

The Brown Patent Friction Clutch Hoisting Engine.

Self-Dumping Buckets, Skip Cars, Friction Clutches, etc.

The Most Perfect Clutch.

ROBERTS MFG. CO. - - - PITTSBURGH, PA.



PATENT DETACHABLE STEEL LINK BELTING,

Sprocket Wheels and Shafting.

Send for Catalogue and reduced Price-List.

JEFFREY CHAIN BELTING.

Also MALLEABLE, WROUGHT, STEEL AND SPECIAL CHAINS for

Elevating and Conveying Machinery

DRIVE BELTS.

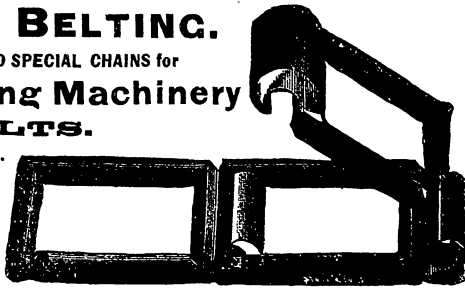
Send for 1893 Catalogue and Reduced Price-List.

THE JEFFREY MANUFACTURING CO.

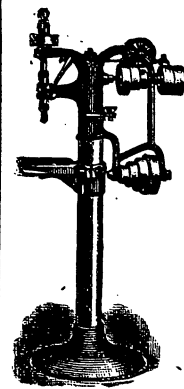
COLUMBUS, OHIO, U. S. A.

Chicago Branch, 48 So. Canal St.

New York Branch, 163 Washington St.



ALEXANDER BROS
BEST OAK BELTING
PHILADELPHIA.



The Norton Drills

for light, sensitive and rapid drilling. 1, 2, 3, 4 or more spindles, sensitive or automatic feed. To drill from 0 to 1/2 inch holes. The latest and best. Most convenient, sensitive and durable drills on the market. Have balanced spindles and balanced tables. Write for prices and description, or for special machinery.

THE

NORTON & JONES MACHINE TOOL WORKS,
PLAINVILLE, CONN.

PIPE

FROM 1-8 TO

24 in. Diameter

CUT,

BENT,

FITTED and ERECTED

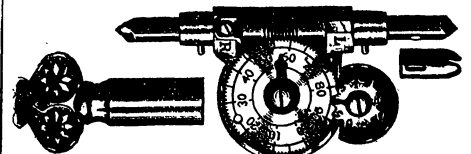
Anywhere in the U.S.

BEST, FOX & CO.,

25th & Railroad Sts.,

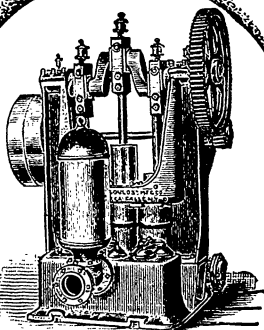
Pittsburgh, Pa.

CHURCH'S DOUBLE AND SINGLE
SPEED INDICATORS.



CHURCH & SLEIGHT, 109 FULTON ST. N. Y.

GOULDS PUMPS Are Better For Light Service



Our Light Service Triplex Pump may be arranged for belt or geared connection with any motive power. We present a new model of our well-known Triplex Electric Pump adapted for any pressure where duty does not exceed 75 feet lift or thirty pounds pressure per square inch. Capacity 150 to 400 gallons per minute. Send for new Catalogue, "Efficient Power Pumps and Applications."

The Goulds Manufacturing Co.,

Manufacturers of Pumps and Hydraulic Machinery,

Factory: Seneca Falls, N.Y., U.S.A. Warerooms: 16 Murray St., New York City.

BOOKS. YOU CAN OBTAIN PROMPTLY the latest work on any subject in which you are interested by addressing DAVID WILLIAMS, Publisher and Bookseller, 96-102 Reade Street, New York.

NEW YORK BELTING & PACKING CO. LTD

JOHN H. CHEEVER,
President.

15 Park Row, New York.

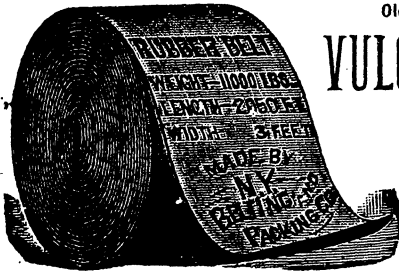
Oldest and Largest Manufacturers in the U. S. of

VULCANIZED RUBBER FABRICS

For Mechanical Purposes.

MACHINE BELTING

With Smooth Metallic
Rubber Surface.

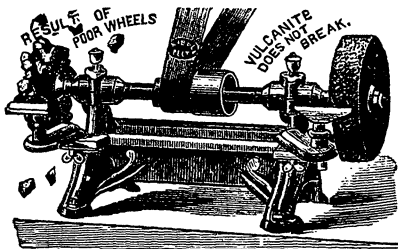


RUBBER TEST HOSE

COTTON "CABLE" HOSE, CIRCULAR, WOVEN, SEAMLESS, ANTISEPTIC

For the use of Steam and Hand Fire Engines, Force Pumps,

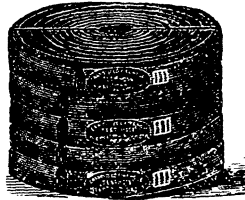
Mills, Factories and
Steamers.



Rubber Cement.

THE ORIGINAL SOLID VULCANITE EMERY WHEELS.

RUN EASY and SAFE. COOL and TRUE. ARE MORE
DURABLE—HENCE CHEAPER. A trial will convince
you of this. KNIFE GRINDING WHEELS
A SPECIALTY.



Rubber Goods to Order for all Mechanical Purposes.

SALESROOMS:

PHILADELPHIA, 308 Chestnut St.
BOSTON, 44 Summer St.
CHICAGO, 131 Lake St.
DENVER, 1601-1611 17th St.
CHARLESTON, 140 Meeting St.
CINCINNATI, 227 West 4th St.
MINNEAPOLIS, 200 1st St.
CLEVELAND, 176 Superior St.

SALESROOMS:

SAN FRANCISCO, 17 Main St.
DETROIT, 18-20 Woodward Ave.
BALTIMORE, 12 N. Charles St.
NEW ORLEANS, 8-12 N. Peters St.
KANSAS CITY, 1311 and 1313 W. 12th St.
ST. LOUIS, 616 Locust St.
DALLAS, 173 Elm St.

H. O. CANFIELD,

MOULDED BRIDGEPORT, CONN.



RUBBER GOODS FOR MECHANICAL PURPOSES.

Small moulded work a
specialty. Send for esti-
mates for moulds and work.

Records, like Pedigrees, are well to consider.

It is on record that after nearly 20 years' service, roofs painted with Dixon's Silica-Graphite Paint have not even required repainting, but were in as good condition as when first put on.

Dixon's Silica-Graphite Paint

Has been in the market for 25 years. Its record for durability and economy is unquestioned.

MAY WE SEND YOU OUR CIRCULARS ?

JOS. DIXON CRUCIBLE CO.,

JERSEY CITY, N. J.

LEVIATHAN BELTING.



Positively un-
equaled for
Strength, Dura-
bility and Traction Power; un-
affected by Heat,
Steam or Water.

Belts for Main
Driving and work
of a heavy nature
a specialty.

MAIN BELTING COMPANY

Sole Manufacturers.

1219-1235 Carpenter St.,
PHILADELPHIA

248 Randolph Street, Chicago.

120 Pearl Street, Boston.

Send for Price-Lists and Samples.

Talcott's Clinching Belt Hooks.



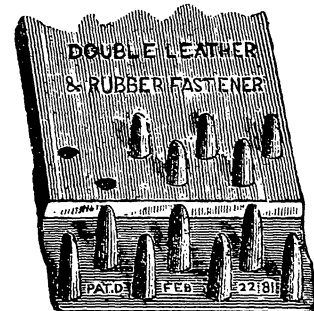
W. O. TALCOTT, Providence, R. I.

MANUFACTURER OF

Four Styles of BELT HOOKS, including 134 Sizes.

SEND FOR CATALOGUE.

Thacher's Patent BELT FASTENERS.

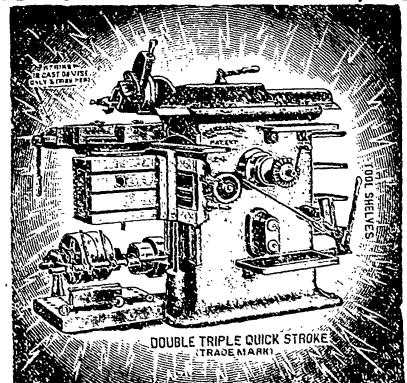


Manufactured by The Claffen Manufacturing Co.
Cleveland, O. Office, 71 and 73 Ontario St.

FOR THE 'Double Triple Quick Stroke' SHAPER

WRITE TO

GOULD & EBERHARDT Newark, N. J.



12 in., 16 in., 20 in., 24 in., 26 in., 30 in. stroke.

E. W. BLISS CO.,

11 ADAMS ST., BROOKLYN, N. Y.

**This is the Most Popular
Press Made.**

Nearly all the best manufacturing establishments in America and many in Europe use one or several of these presses. They are made in various sizes and are used in the manufacture of hardware, cutlery, locks, guns, sewing machines, typewriters and many other articles.

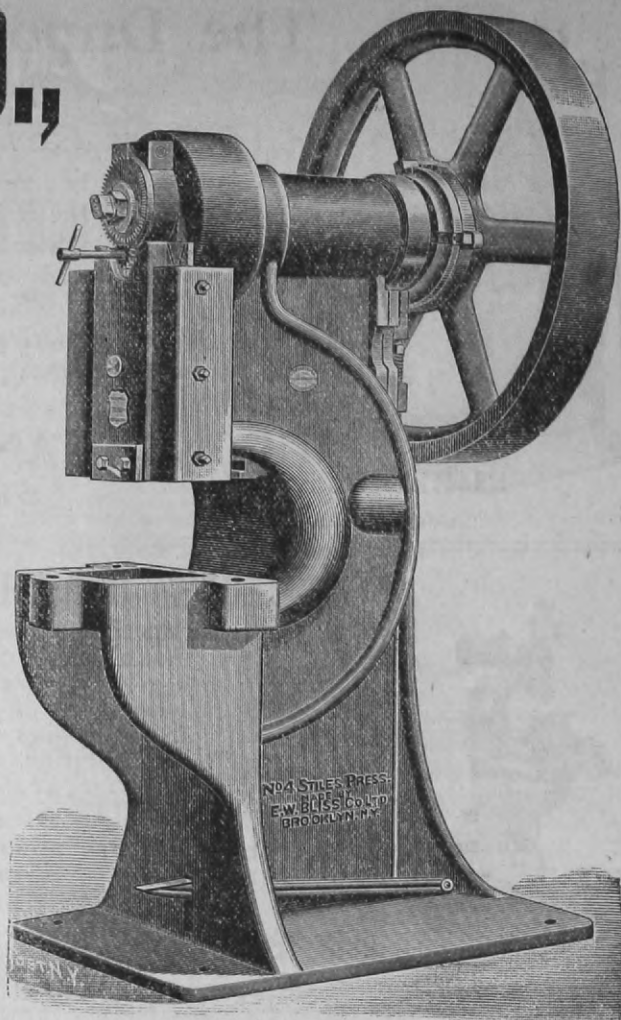
— LARGE LINE OF —

**PRESSES,
PUNCHES,
DROP HAMMERS,
SHEARS, DIES
AND SPECIAL MACHINERY**

ILLUSTRATED IN OUR 400 PAGE CATALOGUE.

OWNERS ALSO OF THE

STILES & PARKER PRESS CO.



No. 4 STILES PRESS.

The superiority of

The Bradley Hammers

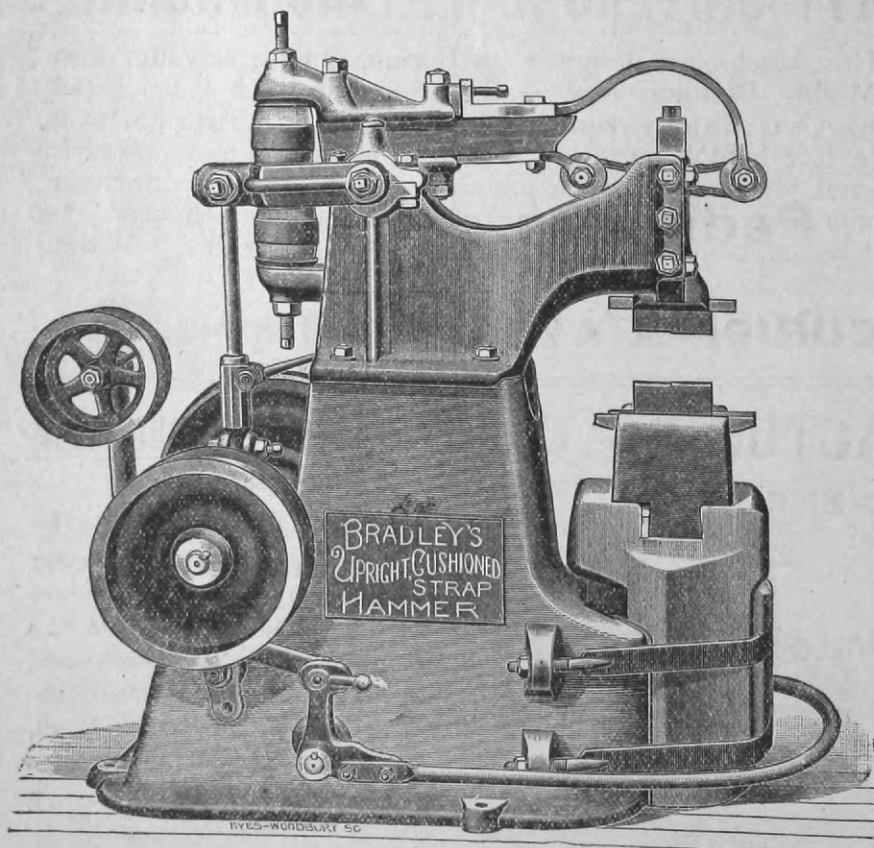
over any other Hammers
ever made is

**Never
Questioned.**

We make them in three styles
and in many sizes.

Our circulars illustrate, describe
and give prices.

More than
2000 IN USE.



BRADLEY & COMPANY,
SYRACUSE, N. Y.

BRANCHES:
NEW YORK,
14 Warren St.
BOSTON,
06-08 Sudbury St.

The Dupont Power Hammer.

ITS POINTS OF SUPERIORITY.

No. 1. EASE OF ADJUSTMENT.

The entire working parts of the Hammer are at the top, in full view of the operator, and every part is readily accessible, being easily operated by inexperienced men.

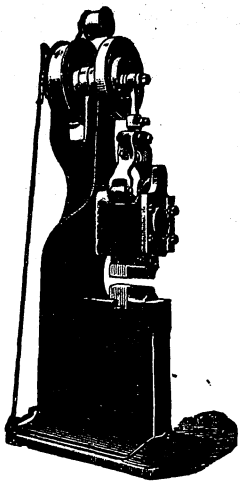
Raising or lowering the Hammer is accomplished by loosening one bolt, and when at the required place tightening it again.

The spring is quickly adjusted by the screws at the ends.

There being no leather straps to break or wear out (all connections being metallic), when once adjusted the spring seldom needs any readjusting.

The dies are keyed in head and anvil and may vary in thickness any amount within the limit of stroke.

DUPONT MANUFACTURING COMPANY,
ST. JOHNSBURY, VT.



THE BECKER UPRIGHT UNIVERSAL MILLERS

Have a remarkable range of utility and are more indispensable than common horizontal millers.

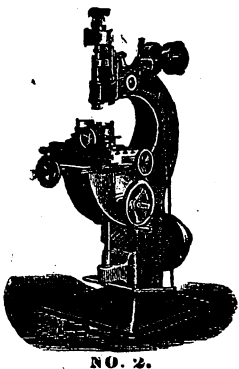
No. 2 is adapted for a great variety of light milling, carrying mills from 1-32 in. diam. up to 2 in. diam. Speeds from 100 to 10,000 revolutions per minute.

No. 3, for all round work, such as *Face Milling, Milling Dovetail Slides, Key Seating, Splining, Boring* and many other purposes. Carries mills from 1-8 in. to 4 in. diam. Speeds from 40 to 2000 revolutions per minute.

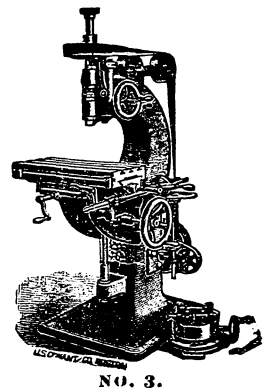
SEND FOR CATALOGUE.

JOHN BECKER MFG. CO.,

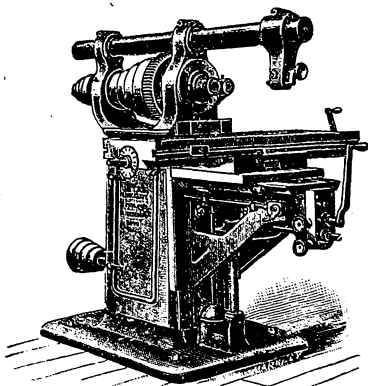
Fitchburg, Mass.



NO. 2.



NO. 3.



HEAVY UNIVERSAL MILLING MACHINE.

This Machine is designed for Boring, Drilling, Facing, Turning, Milling, Profiling, Key Seating, Splining, Rack Cutting (any length), Gear Cutting with Vertical and Angular Attachment up to five feet in diameter. It is the strongest and most powerful Universal Machine made; it has automatic feeds in all directions; it admits of a great range of work, and will do much work that would be impossible on any other Universal Machine. Weight about 5,000 lbs.

PEDRICK & AYER, Philadelphia, Pa.

MORTON MANUFACTURING CO., Practical Blacksmithing

MUSKEGON HEIGHTS, MICH., U. S. A.

BUILDERS OF

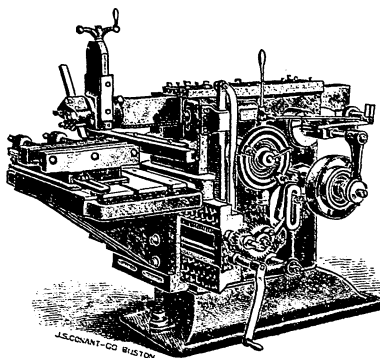
Morton's Patented Reversible Universal Shaper.

Morton's Lightning Keyway Cutter with Key Making Attachment.

Portable Keyway Cutters.

Portable Planers and Special Machinery.

These machines may be seen in operation at the World's Columbian Exposition, Section 23, Column K45, Machinery Hall annex. Write for description and prices. Mention this paper.



Vols. I, II, III and IV.

6½ x 7½; cloth; per vol. \$1.

This work consists of a collection of articles contributed at different times by skilled workmen to the columns of the *Blacksmith and Wheelwright*, and covers nearly the whole range of blacksmith work, from the simplest jobs to the most complex forgings.

Sent, postpaid, on receipt of price, by

DAVID WILLIAMS, Publisher and Bookseller

96-102 Reade St., New York.

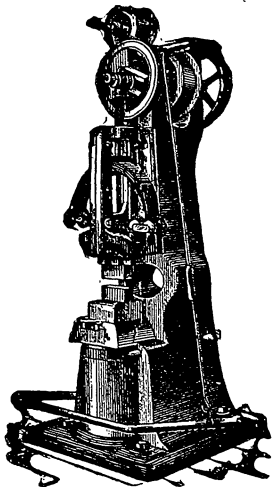
FOR TESTING IRON AND STEEL SPECIMENS, CAR COUPLERS, BRAKE SHOES, CHAIN, SPRINGS, WIRE CEMENT

RIEHLE TESTING MACHINES,

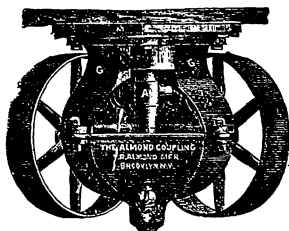
Hydraulic Pumps and Presses, Robie Jacks, Marble Machinery, Iron Founders & Machinists, Riehle Bros. Testing Machine Co., 9th St. abv. Master, Phila

If You Use Power Hammers

Write to us for Circulars.
BELDEN MACHINE CO.
NEW HAVEN, CONN.

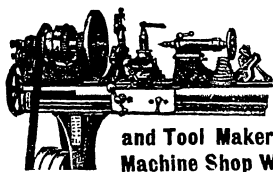


Chicago Office, 65 South Canal Street.



THIS CUT REPRESENTS
ALMOND'S PAT. QUARTER-TURN COUPLING
To Replace Mule Pulleys and Bevel Gears.
It is a noiseless quarter-turn countershaft, self-contained, perfectly lubricated, and gives no trouble. Send for particulars.
T. R. ALMOND, 83 and 85 Washington Street, Brooklyn, N. Y.

FOOT POWER LATHES,



For Electrical and Experimental work.
For Gunsmiths and Tool Makers. For General Machine Shop Work.

High grade tools; elegant in design, superior in construction. The best foot power lathes made, and quality considered the cheapest. Discounts to the Hardware and Machinery trade, quoted on application. Send for Catalogue and Price-List.

W. F. & JNO. BARNES CO.,
69 Ruby Street, ROCKFORD, ILL.
ENGLISH AGENTS, CHAS. CHURCHILL & CO.,
21 Cross St., Finsbury, E. C., London.

Boring-Out or Threading Tool.



This tool is designed to save forging, and also to provide a stiff tool for boring or threading. The tool holder has a V slot milled in top and bottom, one being small to hold a small tool. The round steel can be drawn backward or forward as the work may require. We furnish this holder with one tool for \$1.50.

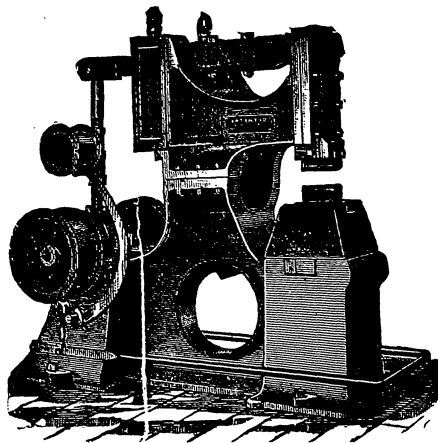
HURLEY BROTHERS
Makers of Fine Tools, HARTFORD, CONN.

LINK-BELT

ENGINEERING CO.
NICETOWN,
PHILA.
49 DEY ST.
NEW YORK

Elevators, Conveyors, Manila Rope Power Transmission Machinery, Ewart Detachable Link Belting
Dodge Chain, Howe Chain, &c. Western connection.
[CHICAGO,] [LINK BELT MACHINERY CO.]

JENKINS' POWER HAMMERS.



Adjustable and elastic stroke, nicety of regulation, efficiency of action, simplicity and durability of construction and the absence of leather straps, steel springs and all complication, combine to make this hammer the favorite wherever used.

JENKINS & LINGLE,
BELLEFONTE, PA.

PITTSBURGH MFG. CO.,

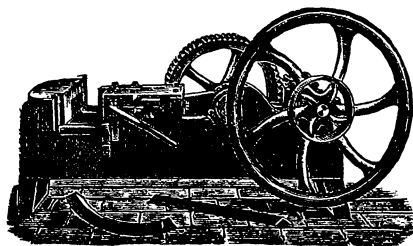
Manufacturers of

Crosgrove's Patent Straightening, Bending and Punching Machines.

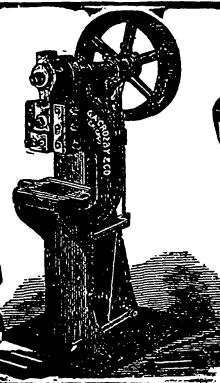
NAIL MACHINERY.

Bolts, Nuts, Rivets, Castings, &c.

PITTSBURGH - PA.

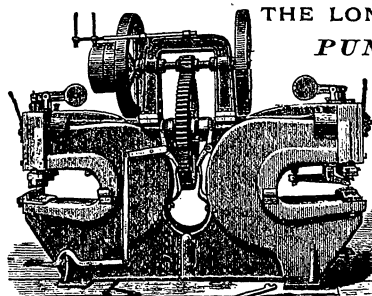


MACROS
Manufacture
PRESSE
SPECIAL MA
SHEET METAL
176 178 So. Clinton

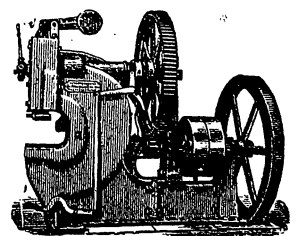


BY AND CO.
of
S. DIES
CHINERY
WORKERS
St., Chicago, Ill.

THE LONG & ALLSTATTER CO., Hamilton, Ohio.
PUNCHES, SHEARS and HAMMERS.



Double.
Single.
Horizontal.
Twin-Boller.
Spacing Gate.
Multiple Angle.
Bar, &c.
Belt and Steam
Driven.
Send for Catalogue.



HYDRAULIC PRESSES and PUMPS

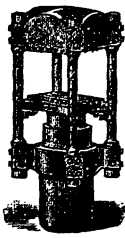
FOR ALL PURPOSES.



Plain Press

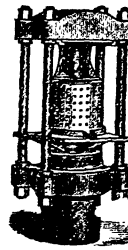
Baling Presses,
Oil Presses,
Embossing Presses,
Die Presses,
Belt Presses,
Frame Benders,
Riveting Presses,
And all other Presses.

WATSON & STILLMAN

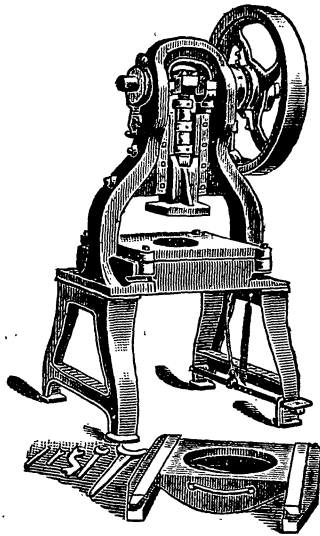


Forging Press.

Hand Pumps,
Belt Pumps,
Steam Pumps,
Automatic Pumps,
Variable Delivery
Pumps,
And over 50 varieties
of Hydraulic Pumps.
Accumulators, Valves,
Gauges, Fittings, &c.
204-210 East 43d
St., N. Y.



Curb Press.



Presses, Dies, Presses, OF ALL KINDS FOR Sheet Metal Ware.

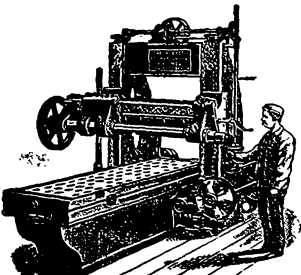
Difficult and Intricate Drawing
Stamping, Embossing, Wiring,
Blanking and Combination
Dies a Specialty.

SUBMIT SAMPLES AND WRITE FOR PRICES.

Stark Machine & Tool Co.,

BUFFALO, N. Y.

Send for Catalogue and mention "The Iron Age."



36 inch x 36 inch x 8 feet Milling
Machines. Weight, 22,000 lbs.

THE Ingersoll Milling Machine Co., ROCKFORD, ILL.

WE MAKE A SPECIALTY OF

Heavy Slab Milling Machines.

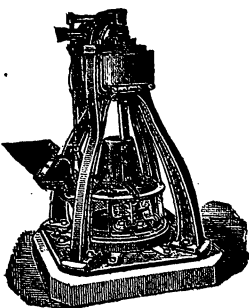
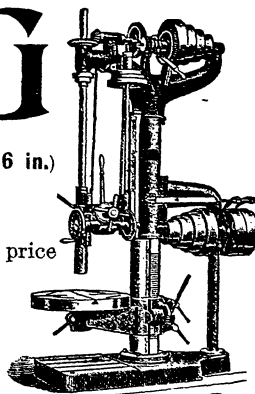
Sizes, 15 inches square to 36 inches square to mill any length.

DRILLING (16, 22, 26 in.) PRESSES. (32 and 36 in.)

BACK GEARED AND AUTOMATIC FEED.

Manufacturers desiring a first-class tool at a reasonable price
should write.

THE HAMILTON MACHINE TOOL COMPANY,
WEST MARKET STREET,
Hamilton, - Ohio, U. S. A.

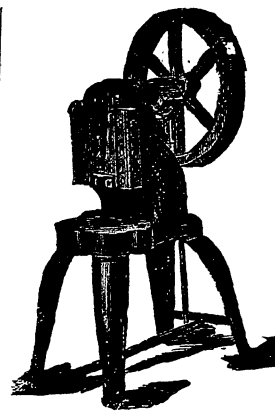


THE GRIFFIN MILL

A perfect pulverizer of all refractory substances by either the wet or dry process. It works better and at less expense than any other Mill, and is conceded to be the only perfect pulverizing Mill manufactured.

For free illustrated pamphlet address

BRADLEY FERTILIZER CO., 92 State St., Boston.

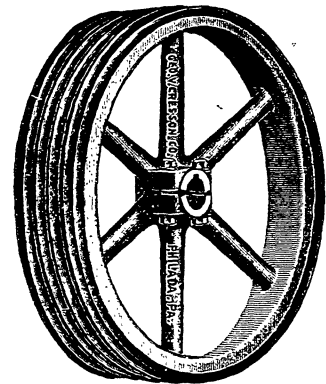


A. H. MERRIMAN,
MERRIDEN, CONN.,
Manufacturer of all Descriptions of
PRESSES.
Catalogue and prices sent on application.

GEO. V. CRESSON CO.,

18th STREET AND ALLEGHENY AVE.

PHILADELPHIA, PA.



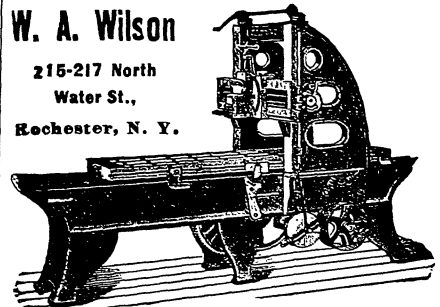
ROPE WHEELS,

All Diameters and Number of
Grooves, for Manilla, Hemp,
Cotton, or Leather Ropes.

W. A. Wilson

215-217 North
Water St.,

Rochester, N. Y.

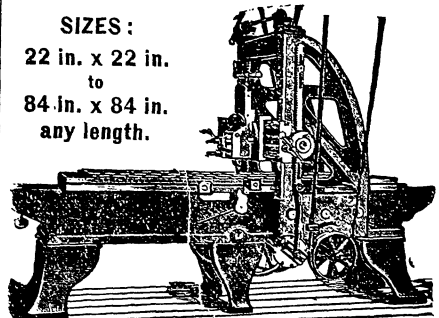


Improved Iron Planers a specialty. 20 x 20, 22 x 23
24 x 24 up to 42 x 42, to plane any length. Send for
description and price-list before purchasing. Manu-
facturers' agent for other tools and machinery. Men-
tion *The Iron Age*.

THE POWELL PLANER CO.

SIZES:

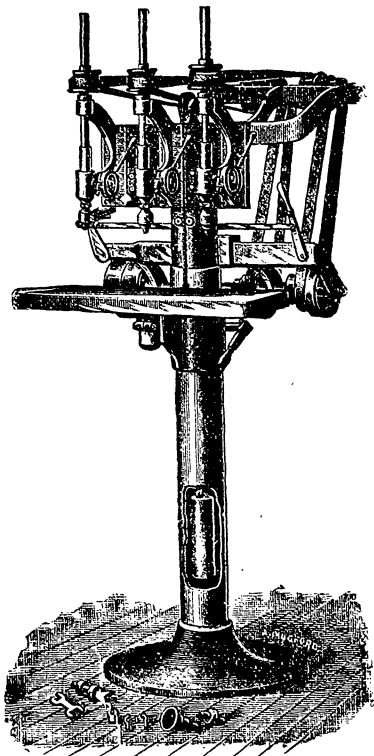
22 in. x 22 in.
to
84 in. x 84 in.
any length.



WORCESTER, MASS.

SIGOURNEY DRILLS.

IMPROVED.

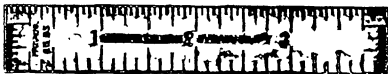


Sensitive, Strong and Interchangeable
One, Two and Three Spindles.

Counter-balanced Spindles and Tables. Vertical range of table, 30 inches, and it will swing to right or left.

SEND FOR CIRCULAR.

THE SIGOURNEY TOOL CO.,
Hartford, Conn.



MACHINISTS' SCALES
PATENT END GRADUATION.

Liberal Discount to the Trade. Send for List.

COFFIN & LEIGHTON, Syracuse, N. Y.

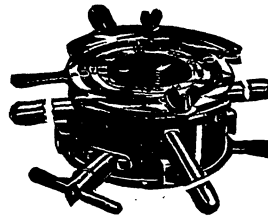
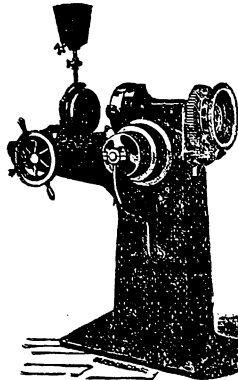
LIGHT DRILL PRESSES
MFRS. OF
THE LARGEST VARIETY
SEND FOR NEW
80 PAGE CATALOGUE
JUST OUT
DWIGHT SLATE MACHINE CO.
HARTFORD, CONN.

ARMSTRONG MAN'G. CO.

OUR ADJUSTABLE STOCKS and
DIES are universally acknowledged to be the
BEST! We also make all our Tools on the same
principle, of the Best Material and Work-
manship, and always with a view of time and
labor saving in their use.

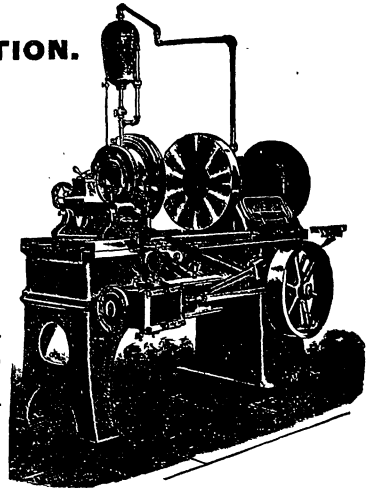
JARECKI MFG. CO. (Limited), Erie, Pa.

PIPE THREADING AND
CUTTING TOOLS OF
ALL DESCRIPTION.



Write for Catalogue showing
the most complete line of 1-8
inch to 16 inch for hand, belt,
engine and with electric mo-
tor attachment.

We can furnish Bolt Threading Attachment for this Machine.

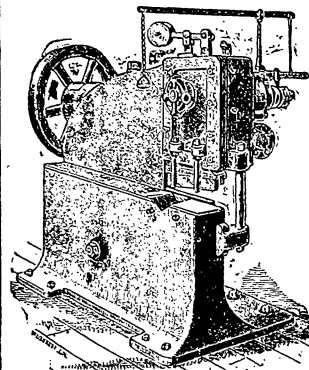


W.W. MINER

G.W. PECK

S. PECK

MINER & PECK M'FG CO.,
SUCCESSORS TO
BEECHER & PECK,
SOLE MANUFACTURERS OF
THE PECK PATENT DROP PRESS
DROP FORGINGS, BLAST FORGES.
NEW HAVEN, CONN.



Gear Universal Shear.

POWER SHEARS

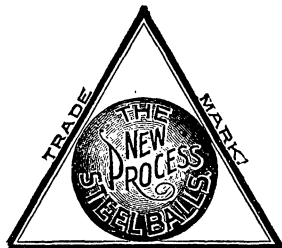
Designed especially for Boiler Makers and
Heavy Sheet Metal Workers. Runs noiseless;
has Anti-friction Bearings for sheet to Slide;
Automatic Stop Clutch; cuts $\frac{5}{16}$ inch; length
of blade, 16 inches. Send for Catalogue.

The Wais & Roos Punch and Shear Co.,

CINCINNATI, O.

STEEL BALLS

For all purposes, from Bicycles to the
heaviest class of machinery. Write to us
for prices and samples, also for information
when in doubt about the proper applica-
tion of balls to heavy bearings.



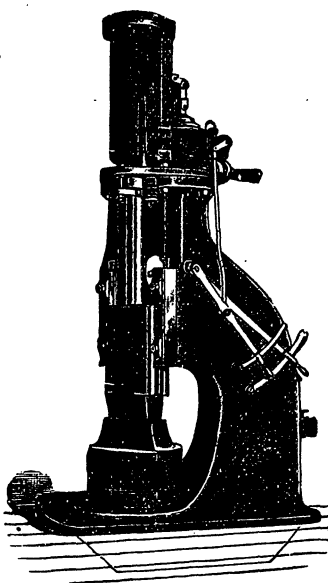
GRANT ANTI-FRICTION BALL CO.,

Fitchburg, Mass.



Bullock Bellows Co.,
Cleveland, Ohio.

**Largest
Mfrs.
in the
World**



Bement, Miles & Co.,

PHILADELPHIA, PA.,

Builders of

Metal-Working Machine Tools

For railroad shops, locomotive and car builders,
machine shops, steam forges, shipyards, boiler
shops, bridge works.

**Steam Hammers for Working Iron
or Steel.**

NEW YORK OFFICE, Equitable Building.

GEORGE PLACE, Agent

THE STURTEVANT STEEL PRESSURE BLOWERS

For Cupola Furnaces and Forges.

THE STURTEVANT SYSTEM

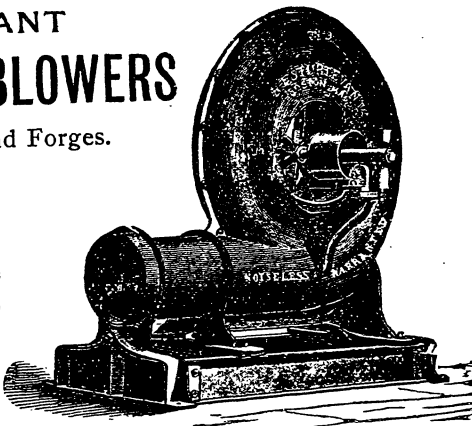
—OF—

Heating and Ventilating

MANUFACTURING ESTABLISHMENTS.

PORTABLE FORGES

SEND FOR CATALOGUES.



B. F. STURTEVANT CO.,

BOSTON, MASS.

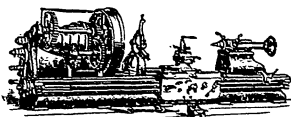
BRANCHES: 91 Liberty St., New York. 16 So. Canal St., Chicago. 135 No. Third St., Philadelphia

FITCHBURG MACHINE WORKS,

MANUFACTURERS OF THE CELEBRATED

FITCHBURG

AND OTHER



48-inch Engine Lathe.

SEND FOR
CATALOGUE B.

ENGINE LATHE

METAL-WORKING MACHINES,

**FITCHBURG,
MASS.**

THE COULTER & MCKENZIE MACHINE CO.,

BRIDGEPORT, CONN.,

MAKE A FIRST-CLASS

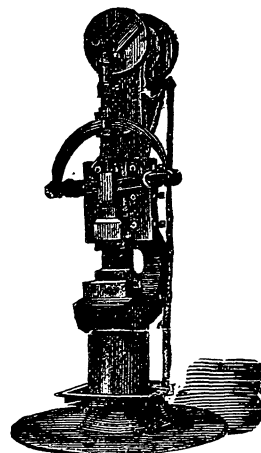
BOILER TEST PUMP.

PRICE, \$15.00.

SENT ON APPROVAL.

DEAD-STROKE POWER HAMMERS

CONSTRUCTION IMPROVED.
Seven Sizes.
5 to 250 Pounds.
Prices Reduced.

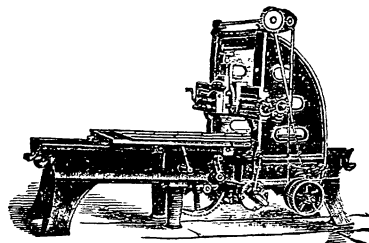


The 15 and 25 pound sizes are specially adapted to
filamentary use, the other sizes for general forging.
Send for circular and references.

DIENELT & EISENHARDT,

MAKERS,

1310 Howard St., Philadelphia.



NEW HAVEN MANUFACTURING CO.

NEW HAVEN, CONN.,

Manufacturers of

IRON-WORKING MACHINERY

B. & O. TIRE UPSETTER. SURE CRIP.

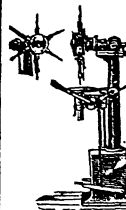
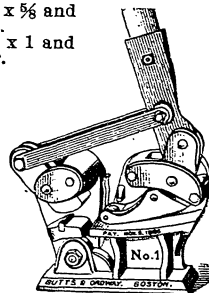
No. 1, Upsets 3 x 5/8 and
smaller.
No. 2, Upsets 4 x 1 and
smaller.

IT IS WITHOUT A
FAULT. ONE MOTION
DOES IT ALL.

Every machine is
tested and warranted
to give satisfaction.
We confidently offer
this Upsetter as the
best to be had.

Send for Price.

BUTTS & ORDWAY,
500 Atlantic Ave.,
BOSTON, MASS.



QUINT'S TURRET DRILLS.

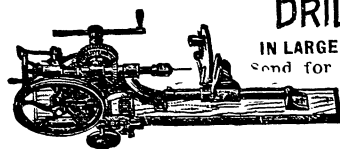
Six Spindle.

Drills from 1-32 to 1/4 hole. Speed
from 250 to 2000 rev.

Suitable for a large variety of
work and is operated with ease
and rapidity.

SEND FOR CIRCULAR.

A. D. QUINT, Hartford, Conn



DRILLS

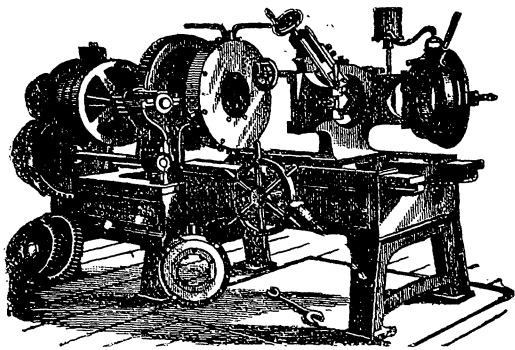
IN LARGE VARIETY.

Send for Catalogue
E.

THE GEO. BURNHAM CO., Worcester, Mass

PATENT RAW HIDE BOUND MALLET CHISEL HANDLES
POSITIVELY WILL NOT SPLIT
PATENT RAW HIDE PINIONS
ESPECIALLY ADAPTED TO HIGH SPEED MACHINERY. NOISELESS
MORE DURABLE THAN METAL. NO LUBRICANT REQUIRED.
NEW PROCESS RAW HIDE CO.
PATENTEES & SOLE MANUFACTURERS SYRACUSE N.Y. U.S.A.

An Introduction to the Study of Metallurgy
By W. C. ROBERTS-AUSTEN, C. B., F. R. S.,
Associate of the Royal School of Mines, Chemist
and Assayer of the Royal Mint, Professor of Metallurgy in the Royal College of Science, with which the Royal School of Mines is incorporated. CONTENTS: Physical properties of metals; alloys; the thermal treatment of metals; fuel; materials and products of metallurgical processes; furnaces; means of supplying air to furnaces; typical metallurgical processes; economic considerations. With numerous diagrams, 202 pages, cloth..... \$2.50
For sale by DAVID WILLIAMS, 96-102 Reade St., N. Y.



D. SAUNDERS' SONS,

—MANUFACTURERS OF—

Pipe Cutting and Threading Machines

For Pipe-Mill and Steam Fitters Use. Tapping Machines for Steam Fitting. Also Steam and Gas Fitters' Hand Tools.

—SEND FOR CIRCULARS.—

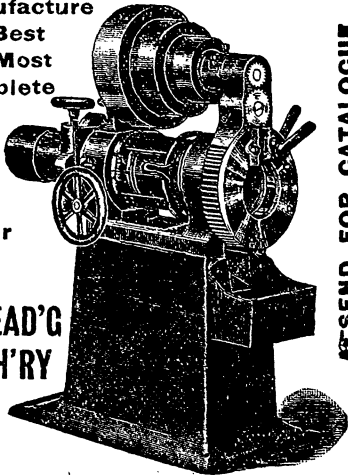
No. 25 Atherton Street, - YONKERS, N. Y.

The Merrill Manufacturing Co.,
TOLEDO, O.

Manufacture
The Best
and Most
Complete
Line
of

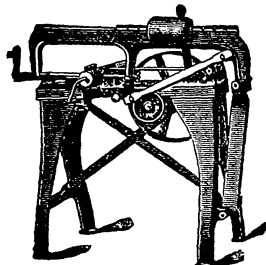
Hand
and
Power

PIPE
THREAD'G
MACH'RY
IN
USE.



SEND FOR CATALOGUE

STOVER POWER HACK SAW.



Cuts off any size
or Shape of Metal
Up to 4½
Inches

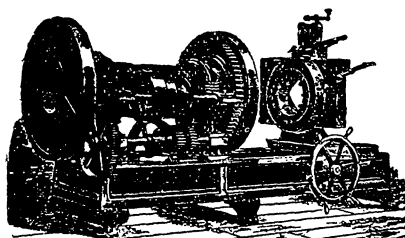
No skill required
to run it. When
bar is cut off the
machine automati-
cally lifts the saw
from the work and
stops.

The pressure on
the saw is much
greater on the
forward stroke
than on the return.

THIS IS THE MOST PRACTICAL MACHINE FOR THE
PURPOSE ever offered to the trade.
No shop can afford to be without it.

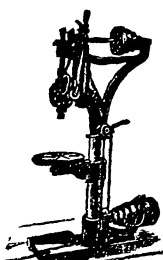
Satisfaction guaranteed. Price, \$25.00

STOVER NOVELTY WORKS, 22 River St., Freeport, Ill.



BIGNALL & KEELER MFG. CO., St. Louis, MO.
MANUFACTURERS OF

Peerless Duplex Pipe Cutting and Threading Machines. Send for Catalogue.
Our Prices are Low and our Goods are the Best.



FOR
Substantial, Well Made,
Low Priced, Patented
20 Inch Drills

with latest improvements
Lever, Combination or Wheel
Feed, address

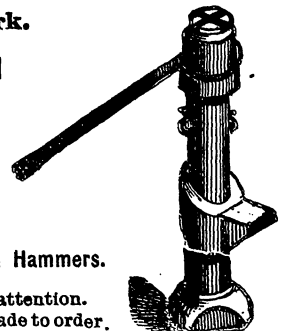
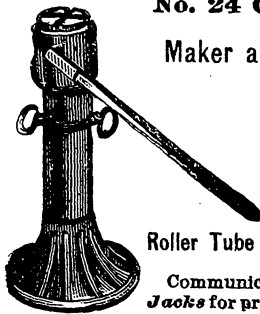
Sibley & Ware,
South Bend, Indiana

RICHARD DUDGEON,

No. 24 Columbia Street, New York.

Maker and Patentee of the Improved

Hydraulic Jacks AND Punches.



Roller Tube Expanders and Direct-Acting Steam Hammers.

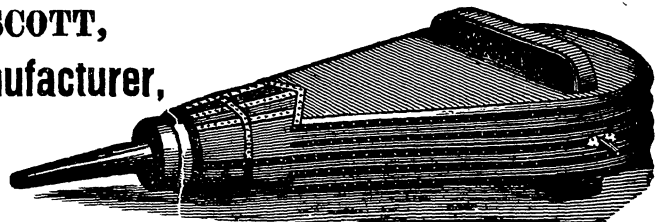
Communications by letter will receive prompt attention.
Jacks for pressing on Car Wheels or Crank Pins made to order.

GEO. M. SCOTT, Bellows Manufacturer,

Johnson Street

Cor. 22d St.,

CHICAGO ILL.



ILLINOIS IRON & BOLT CO.,

Nos. 20 to 26 Main Street,

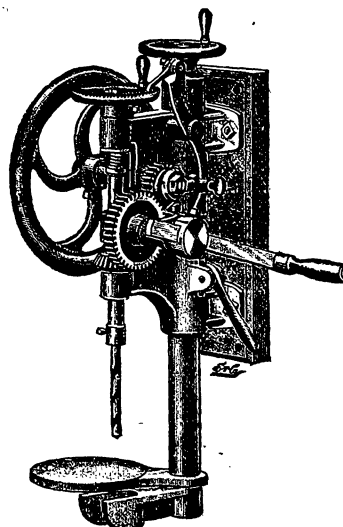
CARPENTERSVILLE, KANE CO., ILL.

MANUFACTURERS OF

BAILEY DRILL No. 2.

By turning the
hand wheel at the
top of Drill the
table may be raised
or lowered.

It is firmly held
in place by an ec-
centric.



The self feed may
be used or not, as
desired.

Fast or slow feed
may be easily ob-
tained.

Full directions
are furnished with
each machine.

The spindle of this Drill is made to receive ½-inch straight shank drill bits,
unless otherwise ordered.

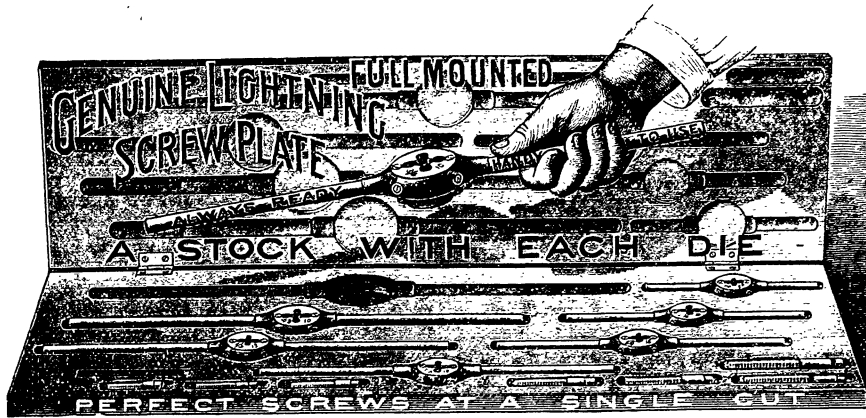
This machine will drill from 0 to ¾ inch hole, and to the center of a ten inch
circle.

The spindle will travel three inches.

BLACKSMITHS' TOOLS, JACK SCREWS, TIRE BENDERS,
TRACK JACKS, &c.

A New Screw Plate. THE FULL MOUNTED LIGHTNING

These plates have a stock with each die. The dies are our celebrated adjustable Lightning dies. Each stock is of correct length and weight to suit size of die. Several sizes of dies may be in use out of the same set at the same time. Send for catalogue.



Made by WILEY & RUSSELL MFG. CO., Greenfield, Mass., U. S. A. Send for new catalogue.

Don't Buy

*Maule's "Skeleton" Pipe Die

If You Wish to Avoid

A Pipe-Threading Die extremely easy of operation by reason of the proper clearance of its cutters;

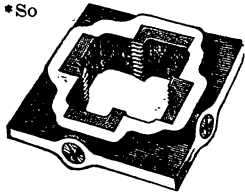
Of surpassing durability secured by the accurate and uniform temper of said Cutters;

Having Cutters that when dull may be removed in a moment, and sharpened on a grindstone or emery wheel;

Of phenomenal cheapness, arising from small first cost coupled to excellence of quality.

If by chance you do not think these points, or the saving of money, objectionable,

*So

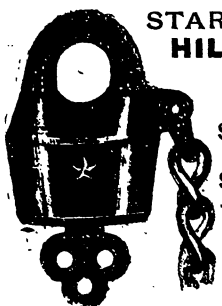


Send us a Postal Note for 62 Cents (do not send us any postage stamps), and we will mail you a sample one-inch Die, either $2\frac{3}{8}$ or $2\frac{1}{2} \times \frac{3}{4}$ thick, which we hereby agree to take back if not to your satisfaction.

HENRY B. PANCOAST & CO.,
PHILADELPHIA, U. S. A.

Send for Catalogue of the "Skeleton" Pipe Die.

Wire Drawing Machines, **WATERBURY**
Gang Slitters,
Power Presses and Dies, **MACHINE CO.**,
Tumbling Barrels, Waterbury, Conn.
Special Machinery. MANUFACTURERS.
Send For Prices.

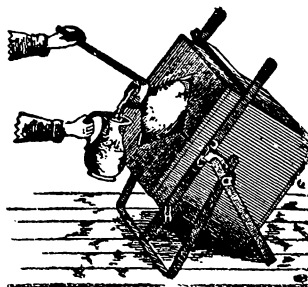


STAR LOCK WORKS, PHILA
HILLEBRAND & WOLF,
Manuf'rs of

1st QUALITY ONLY
SCANDINAVIAN
AND
SPRING PADLOCKS
Trunk & Case
Locks, Carboy

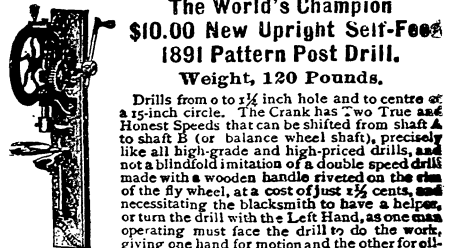
Stands, &c.

CATALOGUES SENT ON APPLICATION.



The No. 1 Champion Lever Blacksmith Forge.

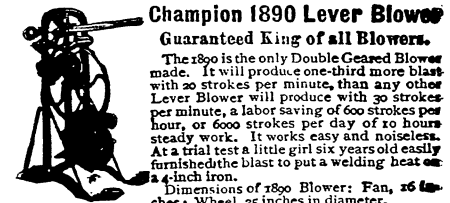
Largest Blacksmith Forge in America.
Fan 16 inches in diameter with a five inch outlet, Hearth 32 by 45 inches.
Provided with our Patent Sloped Bottom Coal Box, which holds one-half bushel. This Slope Bottom Coal Box, in connection with the enormous size of Fan and Hearth, makes this Forge the greatest tool in America for the Blacksmith for quick and easy work.



The World's Champion \$10.00 New Upright Self-Feed 1891 Pattern Post Drill.

Weight, 120 Pounds.

Drills from 0 to $1\frac{1}{4}$ inch hole and to centre of a 15-inch circle. The Crank has Two True and Honest Speeds that can be shifted from shaft A to shaft B (or balance wheel shaft), precisely like all high-grade and high-priced drills, and not a blindfold imitation of a double speed drill made with a wooden handle riveted on the rim of the fly wheel, at a cost of just $1\frac{1}{2}$ cents, and necessitating the blacksmith to have a helper, or turn the drill with the Left Hand, as one man operating must face the drill to do the work, giving one hand for motion and the other for setting and handling the work. By referring to illustration it will be seen that the Gears on this Drill are all provided with Two Journal Bearings, one on each side, this being the most important feature to make a drill strong and powerful, and just where all cheap-made Drills are weak, as their main driving gear revolves on a simple stud, cheaply screwed into the weakest part of the backbone, which is not only cheap and flimsy in construction, but not practical, which none know better than the intelligent mechanic. Our Catalogue illustrates Five Heavier Drills equally as cheap as the above.



Champion 1890 Lever Blower

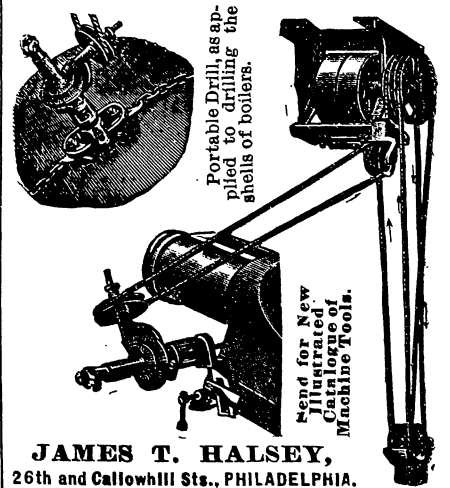
Guaranteed King of all Blowers.

The 1890 is the only Double Geared Blower made. It will produce one-third more blast with 30 strokes per minute, than any other Lever Blower will produce with 30 strokes per minute, a labor saving of 600 strokes per hour, or 6000 strokes per day of 10 hours steady work. It works easy and noiseless. At a trial test a little girl six years old easily furnished the blast to put a welding heat on a 4-inch iron.
Dimensions of 1890 Blower: Fan, 26 inches; Wheel, 25 inches in diameter.

All our Champion Lever Blowers and Forges are supplied with our World Renowned Champion Lever Motion with a record of eight years' constant use, and without a single repair to our knowledge, and is now on more than 55,000 Blowers and Forges in every day use.

CHAMPION BLOWER & FORGE CO.

Lancaster, Pa., U. S. A.



Portable Drill, as applied to drilling the shells of boilers.

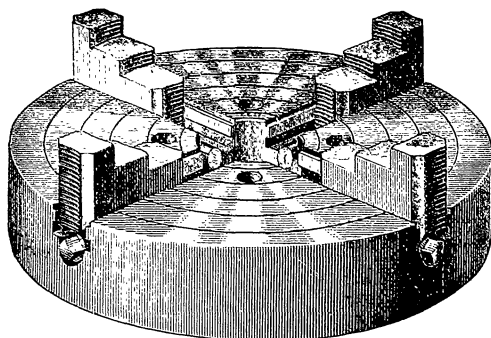
Send for New Illustrated Catalogue of Machine Tools.

JAMES T. HALSEY,
26th and Callowhill Sts., PHILADELPHIA.

UNION MANUFACTURING COMPANY, NEW BRITAIN, CONN.

WAREHOUSE, 103 CHAMBERS ST., NEW YORK.

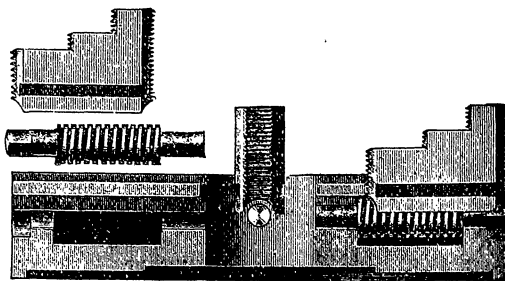
Manufacturers of Combination Chucks, Universal Chucks, Independent Chucks, Combination Reversible Jaw Chucks, Car Wheel Chucks, &c., &c.



INDEPENDENT CHUCK, NO. 18, With Reversible Jaws. —ALSO— Showing Sectional Cut of Jaw.

We guarantee our Chucks in every particular.

Write for Catalogue and Price-List.



CHUCKS

ALL STYLES.

NEW REVERSIBLE JAWS

(DOVETAILED). '92 Catalogue now ready.

THE HOGGSON & PETTIS MFG. CO.

Est. 1849. NEW HAVEN, CONN.



SKINNER CHUCKS.

Independent, Universal and
Combination Lathe Chucks

Also DRILL CHUCKS.

Skinner Chuck Co.,
NEW BRITAIN, CONN.

Send for CATALOGUE.

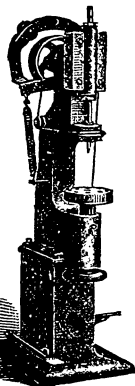
JOHN ADT &

New Haven, Conn.

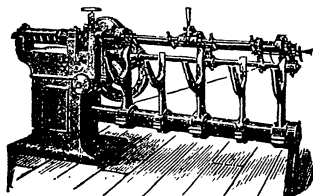
BUILDERS OF

MACHINERY FOR HARDWARE MANUFACTURE.

Elastic Rotary-Blow Riveting Machine.



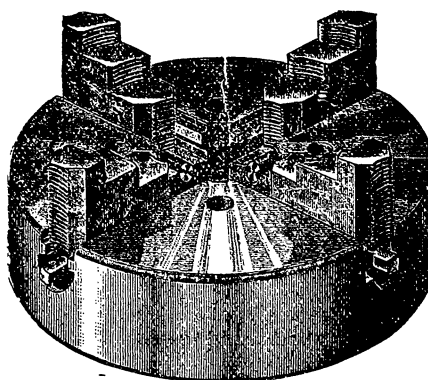
Butt Milling
Machinery,
Butt Drilling
Machinery,
Riveting
Machines,
Wire Straightening
Machinery,
Foot Presses,
Sprue Cutters,
Etc.



Automatic Wire Straightening and Cutting Machine.

The Prospector's Field-Book and Guide in the Search for and the Easy Determination of Ores and other Useful Minerals. By Prof. H. S. OSBORN, LL.D. EXTRACT FROM THE PREFACE: In the following pages we have attempted to present such a view of the whole subject of prospecting for the useful minerals that any liberally educated reader may fully comprehend our meaning. We have therefore explained special terms where we have thought it convenient to use them, and where the technically educated student would not need an explanation. The table of contents and index have both been carefully prepared, and being very full, will make reference to any subject in the volume easy and satisfactory. 44 engravings. 175 pages \$1.50

For Sale by David Williams 96-102 Reade St., New York.



IMPROVED INDEPENDENT CHUCK

This cut represents a line of Improved Independent Reversible Jaw Chucks that we have lately added to our large list of Universal and Combination Chucks. We make this style of Chuck in twenty-two sizes, varying in size by two inches from four to thirty-eight inches in diameter.

Send for Illustrated Price List.

The E. HORTON & SON CO.,

Windsor Locks, Conn., U. S. A.,

Or CHAS. CHURCHILL & CO., 21 Cross
St., Finsbury, London, E. C., England.

'CUSHMAN' CHUCKS.

We manufacture and keep in stock a full line of chucks for all purposes.

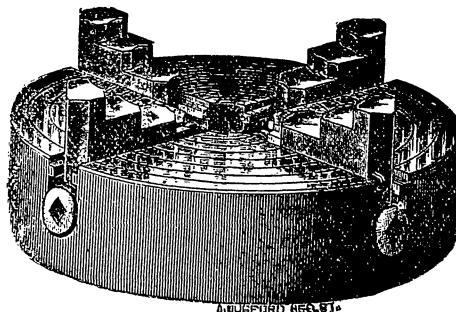
Independent 4 Jaw Chucks from 4 to 26 Inch.
Patent 4 Jaw Lathe Chucks from 4 to 26 Inch.
Reversible Face-Plate Jaws for Use on Lathes from 30 to 72 Inch
Two-Jaw Chucks, Round and Box Body, from 4 1/2 to 18 Inch.
Universal Chucks from 2 to 21 Inch, in several styles.
Combination Chucks from 4 to 24 Inch.
Drill Chucks four styles.
Centering Chucks.
Special Chucks for Cutting-off Machines. A full line and some new improvements.

We also make a great variety of special Chucks for holding bicycle parts, valves, fittings and other special shaped pieces.

A 44-Page Catalogue Sent on Application.

THE CUSHMAN CHUCK CO.,
Hartford, Conn.

CHAMPION INDEPENDENT CHUCKS.

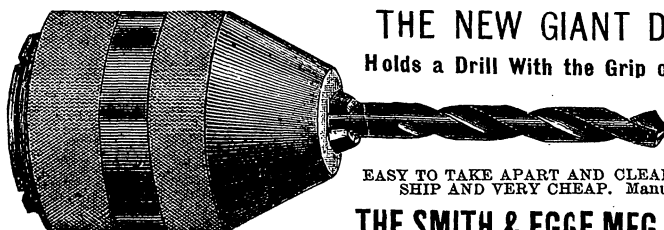


An entirely new line of small Chucks, provided with 3 or 4 independent reversible steel jaws. The best Chuck in the market for foot lathes. Ask your dealer for them or write to us.

THE D. E. WHITON MACHINE CO

Sole European Agent SELIG SONNENTHAL & CO., London.

New London, Conn.



THE NEW GIANT DRILL CHUCK.

Holds a Drill With the Grip of a Giant. All Steel
Parts Interchangeable.

SIMPLE IN CON-
STRUCTION.

EASY TO TAKE APART AND CLEAN. BEST OF WORKMAN-
SHIP AND VERY CHEAP. Manufactured and sold by

THE SMITH & EGGE MFG. CO., Bridgeport, Conn.

For description and prices of the tools illustrated herein, ask for the

HARDWARE CATALOGUE

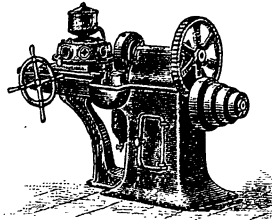
— OF —

The Pratt & Whitney Co.,

Hartford, Conn., U. S. A.,



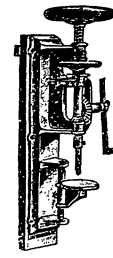
BIT BRACE COLLET and DIE.



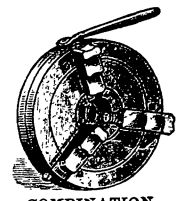
TURRET HEAD BOLT CUTTER.



SPIRAL SHEAR PUNCH.



HAND DRILL.



COMBINATION LATHE CHUCK.

AND MENTION THE ARTICLES IN WHICH YOU ARE INTERESTED.

Instantaneous Clutch.

No Lost Motion.

PAT. FRICTION DRILL-STOCK.

BOILER FEED.



CAN BE USED IN PLACES SO CONTRACTED THAT A RATCHET WOULD BE USELESS.

SMITH FRICTION DRILL & TOOL CO., - - - BOSTON, MASS.

Send for Catalogue:



Our Bevel Die.

Wells Bros. & Co., Greenfield, Mass. U. S. A.

MANUFACTURERS OF

Labor-Saving Tools and Machinery.

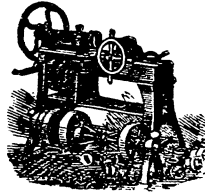


Screw Plates, cutting all sizes.

"LITTLE GIANT"

Upsetters, Tire Benders, Foot Vises, Drilling Machines, Tire Wheels, &c., &c.

Send for our 1889 Catalogue of 62 pages.



Bolt Cutters and Nut Tappers.



Sectional View Collet.



Machine Nut Tap.



All Sizes to 1 1/4 inches diameter.



Hand Nut Tap.

BUTTERFIELD & CO., Derby Line, Vt.,

Manufacturers of SCREW-CUTTING TOOLS In Great Variety.

WRITE FOR ILLUSTRATED CATALOGUE.

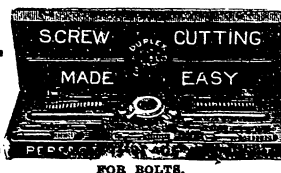


THE ADJUSTABLE
"DUPLEX" DIE STOCK.

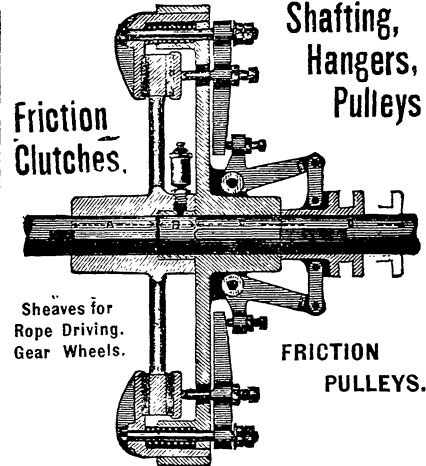
Quick. Accurate. Durable.

15,000 now in use.

HART MANUFACTURING CO.,
CLEVELAND, O., U. S. A.



FOR BOLTS.



Friction Clutches.

Shafting,
Hangers,
Pulleys

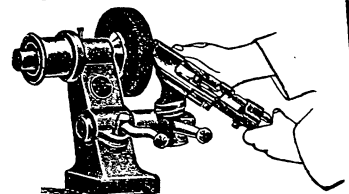
Sheaves for
Rope Driving.
Gear Wheels.

FRICTION
PULLEYS.

KEYSTONE CLUTCH AND
MACHINE WORKS,

1708-1710 Germantown Avenue,
PHILADELPHIA, PA.

DRILL GRINDER.



THE WASHBURN SHOPS,
WORCESTER, MASS.



TINNER'S TOOLS
ROLLS.
CAN MAKER'S TOOLS
DIES.
ROOFER'S TOOLS
PRESSES.
SHEARING MACHINES.

Dear Sir
YOU ARE CORDIALLY INVITED TO INSPECT
OUR EXHIBIT
OF **MACHINES and TOOLS**
FOR SHEET **METAL WORKERS.**
AT MACHINERY HALL, SECTION 28.
WORLD'S COLUMBIAN EXPOSITION, CHICAGO, ILL.
EXPERIENCED ATTENDANTS IN CHARGE.
VERY RESPECTFULLY YOURS

NIAGARA STAMPING and TOOL CO. BUFFALO, N. Y.

**Portable
Drilling
Machines**
Manufactured by
ALBERT L. COLBURN,
4 Wall St., New Haven, Conn.
SEND FOR CATALOGUE.



J. POPPING'S
Patent
Machine & Tool Wks.

MANUFACTURERS OF
Solid Iron Shoulder Rabbet Planes, etc., etc.
and Hofstatter's Patent Hair Picking machine.
N. E. Cor. 58 St. and 11th Ave., N. Y.

THE STANDARD TOOL CO., CLEVELAND, OHIO.

MANUFACTURERS OF

Increase Twist Drills, Reamers, Taps, Milling Cutters and Chucks.

Taper Shank
Drills,
St. Shank Drills,
Screw-driver
Bits,
Reamers,
Shell and Solid
Taper Reamers.



Bit Stock Drills for Metal or Wood.



Wood-Boring Brace Drills, will cut off nails.

Hand Taps,
Mach. Screw Taps
"Standard" Drill
Chuck,
"Ellenwood" Drill
Chuck,
Sq. Shank Drills
for Ratchets,
Twist Drills for
Blacksmiths'
Presses

Sockets for
Taper Shank
Drills.

Reamers in
all sizes.

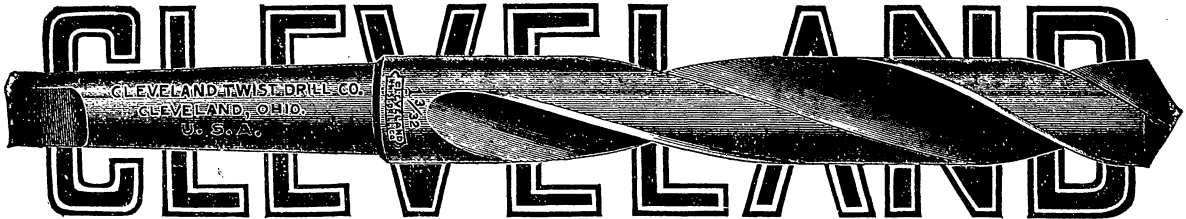
NEW YORK OFFICE, 33 CHAMBERS ST. Send for Catalogue

1874

OLD RELIABLE.

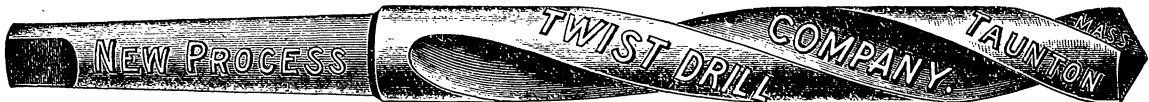
1898

Send For Catalogue.



Write For Discounts.

Our Drills are Hot Forged. The best part of the steel IS NOT CUT OUT and thrown away.



They are TOUGHER, STRONGER, BETTER than is possible to attain by milling. Catalogue and Discounts sent on application.

STOW FLEXIBLE SHAFT,

Invented and
Manufactured by
**THE
STOW MFG. CO.,**
Established 1875. Binghamton,
N. Y.
**PORTABLE.
DRILLING
TAPPING.
REAMING.**

General European Agents,
SELIG SONNENTHAL & CO.,
85 Queen Victoria St., LONDON, ENGLAND.

Thos. H. Dallett & Co.
York St. and Sedgley Ave.,
PHILA.
MANUFACTURERS OF
Portable Drills, Hand
Drills, Boiler Shell Drills
Electric Motors specially
adapted for driving Ma-
chine Tools, Cranes, Ele-
vators, Pumps, Presses and
other machinery.
Complete Power and Light
Plants Installed.

Stow Flexible Shaft Co., Limited,

26th, Callowhill & Biddle Sts.,
PHILA., PA.,
Manufacturers of
**PORTABLE DRILLING,
TAPPING, REAMING
and BORING MACHINES**
Also Tools for Emery Wheel
Grinding, Metal and Wood Pol-
ishing, Cattle Brushing and
Clipping, &c.
Gen'l European
Agents.
Bolling & Lowe,
2 Lawrence,
Pountney Hill,
LONDON, ENG.

Morse Twist Drill & Machine Co., NEW BEDFORD, MASS.

Manufacturers of Morse Pat. Straight-Lip Increase Twist Drills,



Bit Stock Drills, Solid and Shell Reamers, Drill Grinding Machines,

Milling



Cutters,

Beach's Patent Self-Centering Chucks, and Special Tools to Order.



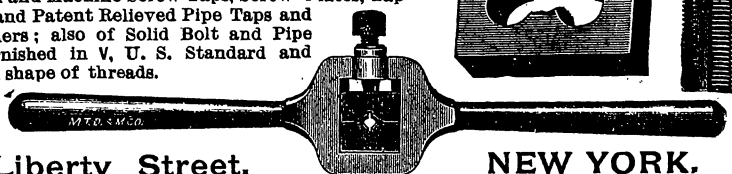
ALL TOOLS EXACT TO WHITWORTH STANDARD GAUGES.

MANNING, MAXWELL & MOORE,

Sole Sales Agents for THE MORSE TWIST DRILL AND MACHINE CO.'S



Manufacture of Patent Machine Relieved Nut, Hand,
Blacksmith and Machine Screw Taps, Screw Plates, Tap
Wrenches and Patent Relieved Pipe Taps and
Pipe Reamers; also of Solid Bolt and Pipe
Dies. Furnished in V. U. S. Standard and
Whitworth shape of threads.



111 Liberty Street,

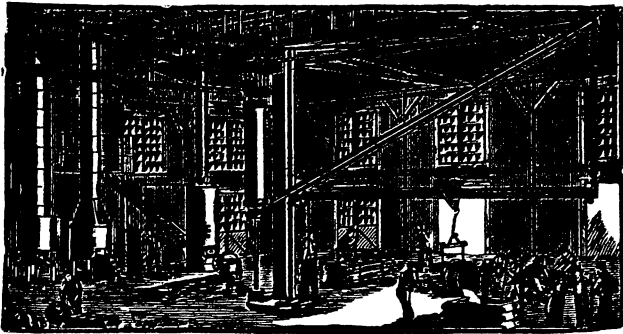
NEW YORK.

SOMETHING NEW.

If you are a sportsman read this ad. or send for an illustrated list of **THE NEW EUREKA CLEANING SET**, which we have added to our list of gun cleaning tools. The No. 161 Gun Cleaning Set is considered by sportsmen who have it to be the most useful set of tools ever put up for cleaning a gun.

It contains the following implements: Madeira Cleaning Rod, Bristle Brush, Flannel Wiper, Scratch Brush, bottle of Belmontyle Oil, Screw Driver, Oil Can and Tube of Paravaseline. Made in 10, 12, 14, 16 and 20 ga. Sample sent on receipt of \$1.25. Ask your dealer to show you this set.

THE BRIDGEPORT GUN IMPLEMENT CO., New York.

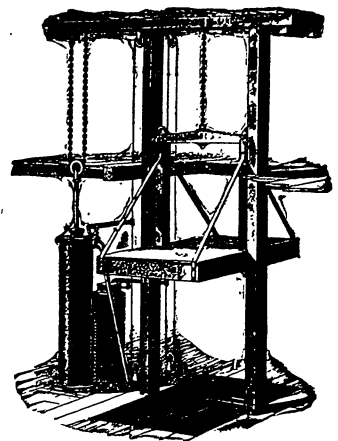


5-ton Ridgway Crane in Foundry Diamond State Iron Co., Wilmington Del.

SAFE, RAPID, SURE

—AND—

NOT COSTLY.



Steam-Hydraulic Elevator.

RIDGWAY STEAM HYDRAULIC CRANE.

Protect the Lives of Your Men!

TERRIBLE ACCIDENT IN A FOUNDRY.

CRANE CHAIN BREAKS WITH LADLE OF MOLTEN IRON.

TO THE EDITOR OF THE IRON TRADE REVIEW:

Enclosed find clipping from the Sharon, Pa., *Telegraph*, of June 24, giving an account of an accident at our works which fearfully demonstrates "The Unexpected in the Foundry." A sixty-ton heat was in progress of being run off and at the second lifting of the crane ladle, the hoisting chain parted and let the ladle drop five feet, striking the side of the cupola's ladle pit, and throwing the metal over the body of George Miser. Though almost enveloped by seething fluid iron, he retained his senses, and while attempting to crawl out of the metal was grasped by two men, who were horrified to find his skin come off at every touch. The unfortunate man lived three hours. It is the first serious accident I have had under my management of heavy work, for 24 years in the foundry. It took two and a half hours to resume melting, and after running down what iron remained in the cupola, the bottom was dropped. The chain which broke was best English make, and tested to lift 20 tons with safety. Its load at the time of the accident was about five tons. This suggests the query, *Why do chains generally break with the lighter loads?* This, I think, is the experience of others as well as myself. Yours truly, THOS. D. WEST.

Sharpsville, Pa., June 26, 1893.

The Ridgway Steam-Hydraulic Crane saves such accidents. In our crane the load is held by four separate and independent short chains, two at each end of the jib. Each of these chains is amply heavy to alone safely support the load. The breaking of a single link will not allow the load to drop. Two chains must break at the same end at the same moment to drop the load. An impossibility. Our crane cannot be overloaded, as diameter of cylinder fixes the maximum load. If there is such a thing as Perfection in a machine, it is found in our Steam-Hydraulic Crane. Of the large number in use in the best Foundries all over the land, the universal verdict is that it is

THE GREATEST FOUNDRY CRANE KNOWN.

The crane that fills the exacting requirements of a foundry is the crane for Everywhere.

CRAIG RIDGWAY & SON,

Coatesville, Pa.

THE WOODRUFF SYSTEM OF KEYING

Does not require skilled labor to cut key way or fit key.

The peculiar way of inserting the key practically makes it part of the shaft.

A man will fit more than double the number of keys in a day than by the ordinary method.

Will save you from 50 to 75 % on the cost of your keying.

ENDORSED BY MECHANICS AND ENGINEERS.

Illustrated pamphlet containing a full description will be sent free on application

FOR MACHINERY THE WOODRUFF MFG. CO., Hartford, Conn.

SENT ON 30 DAYS' TRIAL.

METAL BAND SAW MACHINE,

MADE BY

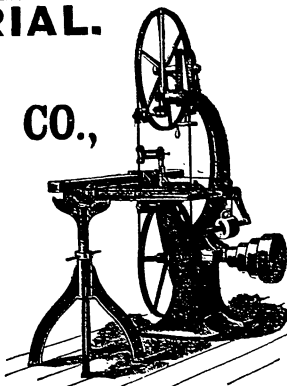
CROSS & SPEIRS MACHINE CO.,

WATERBURY, CONN.

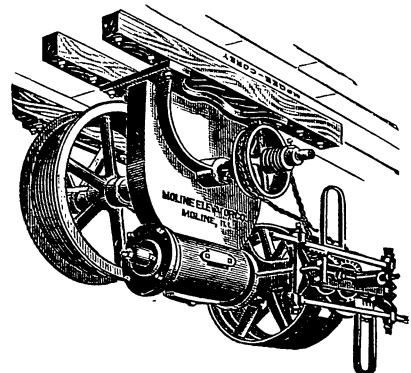
SAWS tubing, square or straight, also sheet
SAWS brass, rods and bars.
curves and scrolls, gates from castings, etc.

**INDISPENSABLE TO ALL METAL WORKERS,
Handy, Labor Saving.**

Self-Regulating and Does Not Require Skilled Labor
SEND FOR PRICE.



MOLINE ELEVATOR CO.



MANUFACTURERS OF
**POWER ELEVATORS,
HAND ELEVATORS
and DUMB WAITERS.**
WRITE FOR PRICES AND CIRCULARS.
MOLINE ILL

THE ROBERT W. HUNT & CO.

Bureau of Inspection, Tests and Consultation.

Rails, Splices and Cars. Analytical and Physical Laboratories. Examination of Iron and Steel Works and advice on Processes.

General Office: The Rookery, Chicago. Branch Offices: Hamilton Building, Pittsburgh; 28 Chestnut St., Philadelphia; 80 Broadway New York.

DUNHAM NUT MACHINE CO.,

Unionville, Conn.,

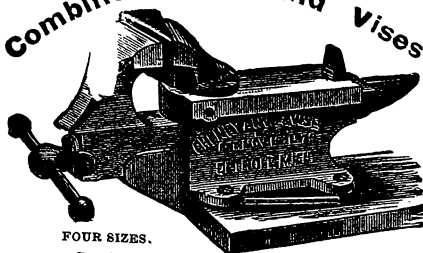
Manufacturers of

AUTOMATIC COLD PRESS NUT MACHINES

FOR MAKING CHAMFERED AND TRIMMED NUTS.

Correspondence Solicited.

CHENEY'S Combined Anvils and Vises



FOUR SIZES.

Send for catalogue and discounts.
Fulton Iron and Engine Works,
28 Brush St., Detroit, Mich.
ESTABLISHED 1852.



Highest Efficiency.

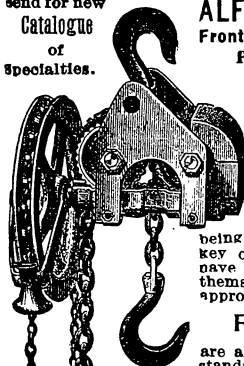
WESTON'S NEW TRIPLEX Chain Block

far exceeds all predecessors.
Send for Prof. Thurston's report
of comparative tests of all
chain pulley blocks.

The Yale & Towne Mfg. Co.
STAMFORD, CONN.

New York, 84-86 Chambers St.
Chicago, 152-154 Wabash Ave.
Philadelphia, 1120 Market St.
Boston, 224 Franklin St.

Send for new
Catalogue
of
Specialties.



ALFRED BOX CO
Front, Poplar and Canal Sts.
Philadelphia, Pa.

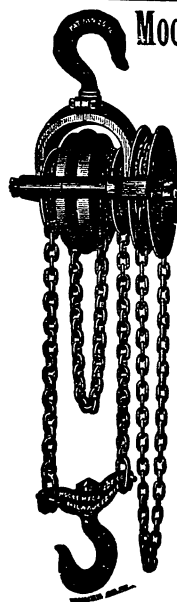
Manufacturers of
Box's Pat. Double

Screw Hoists 13,000 in use.

Many have done hard
continuous duty 5 years
without a single part
being renewed. This is the
key of our success. They
have built up a reputation
themselves that cannot be
approached. Our improved

Radial Drills

are also assuming the same
standard.



Moore Mfg. & Fdry. Co.,

Milwaukee, Wis., U. S. A.,
Manufacturers of
Moore's Anti-Friction

Differential
Chain
Pulley
Block.

A New Movement!
A Perpetual Com-
pound Lever!
Powerful, Simple and
Durable!
One Man Can Lift to
the Full Capacity of the
Block.
Self-Sustaining at Any
Point.
The Block Always
Hangs Plumb.

Send for descriptive price-list,
mentioning this paper.

Salem Foundry and Machine Shop

BUILDERS OF

ELEVATORS

SALEM, MASS.

A WORD TO THE WISE.

Our ELECTRIC MOTORS

are operating numerous

IRON AND STEEL MILLS AND MACHINE SHOPS ECONOMICALLY,
SUCCESSFULLY AND SATISFACTORILY.

WRITE FOR OUR ILLUSTRATED CATALOGUE.

THOMSON-HOUSTON MOTOR COMPANY

BRANCH OFFICES:

44 Broad St., New York.
820 Atlantic Ave., Boston, Mass.
173 & 175 Adams St., Chicago, Ill.

509 Arch St., Philadelphia, Pa.
Fifth and Race Sts., Cincinnati, O.
401-407 Sibley St., St. Paul, Minn.
Masonic Temple, Denver, Col.

Fruitful Building, Atlanta, Ga.
1333 F St., N. W., Wash., D. C.
15 First St., San Francisco, Cal.

All business outside the United States transacted by THE THOMSON-HOUSTON INTERNATIONAL
ELECTRIC CO., 44 Broad Street, New York.

LATHES.

ISRAEL H. JOHNSON, JR., & CO., - PHILADELPHIA.

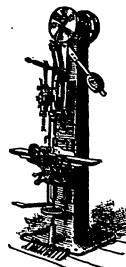
WOOD-WORKING MACHINERY

OF EVERY DESCRIPTION.

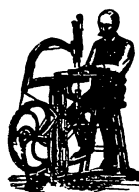
J. A. FAY & EGAN CO.,

179 to 199 W. Front Street,
CINCINNATI, OHIO, U. S. A.

OWNERS AND OPERATORS OF
J. A. FAY & CO. THE EGAN CO.



Our line is the largest in
the world, comprising nearly
1000 different machines.
Our plant is the largest in
the world, comprising nearly
11 acres of working surface.
Our catalogues are the
finest ever issued by a ma-
chinery concern.



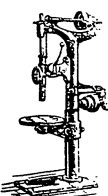
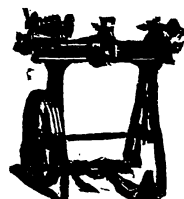
Patent Foot Power Machinery

SCROLL SAWS, CIRCULAR SAWS,
MORTISERS, LATHES, &c.

For Carpenters, Builders, Cabinet Makers, and all Wood
and Metal Workers. Catalogue free.

SENECA FALLS MFG. CO.

255 Water St., Seneca Falls, N. Y.



UPRIGHT Universal and Radial Boring and Turning Mills.

BICKFORD DRILL AND TOOL CO.,
10 Lawrence St., Cincinnati, O.

DRILLS

MECHANICAL

DRAWING TAUGHT BY MAIL

Also, MECHANICS, Mining, Prospecting, Arithmetic, etc.
To begin, students only need know how to read and write.
DIPLOMAS Awarded. Low Prices. Send for FREE
Circular to THE CORRESPONDENCE SCHOOL OF MECHANICS, SCRANTON, Pa.

The English and American Mechanic:

AN EVERY-DAY HAND-BOOK FOR THE WORKSHOP AND THE FACTORY.

CONTAINING

Several Thousand Receipts, Rules and Tables indispensable to
the Mechanic, the Artisan and the Manufacturer.

By B. Frank Van Cleave.

A new, revised, enlarged and improved edition, edited by Emory Edwards, M.E.

ILLUSTRATED WITH EIGHTY-FIVE ENGRAVINGS.

(In one volume, 500 pages, 12mo, closely printed, containing a vast body of information of value
to all practical men. Elegantly bound in scarlet cloth, gilt. Price \$2.00.

SENT POSTPAID, ON RECEIPT OF PRICE, BY

DAVID WILLIAMS, Bookseller and Publisher,
96-102 Reade Street, NEW YORK.



WM. SELLERS & CO.,

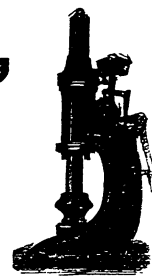
INCORPORATED,

PHILADELPHIA, PA.,

—MANUFACTURERS OF—

Improved Machine Tools for Working Iron and Steel,
High Speed Power Traveling and Swing Cranes,
Injectors, Locomotive Turn Tables, Shafting, &c., &c.
Testing Machines, under patents of A. H. Emery.

Prices, Descriptive Matter, &c., Furnished on Application.



MORSE ELEVATOR WORKS.

MORSE, WILLIAMS & CO.,

Manufacturers and Builders of

Electric, Hydraulic, Belt and Hand Power Passenger and Freight

ELEVATORS.

1105 Frankford Ave., Philadelphia,

88 Lincoln St., Boston,

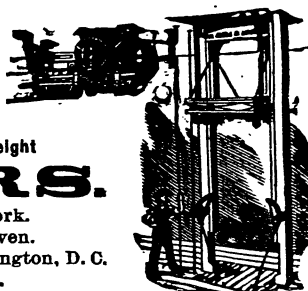
425 Spruce St., Scranton, Pa.,

1118 Chamber of Commerce Building, Chicago, Ill.

108 Liberty St., New York.

82 Church St., New Haven.

116 E St., N. W., Washington, D. C.



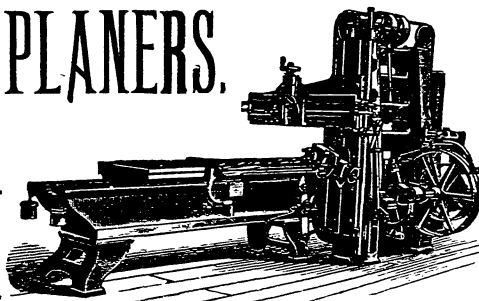
OPEN SIDE IRON PLANERS.

A FEW READY FOR

IMMEDIATE DELIVERY.

WRITE TO US DIRECTLY FOR

CATALOGUE AND PRICES.



THE DETRICK & HARVEY MACHINE CO., Baltimore, Md

FAIRMOUNT MACHINE CO.,

(Successors to Thomas Wood & Co.)

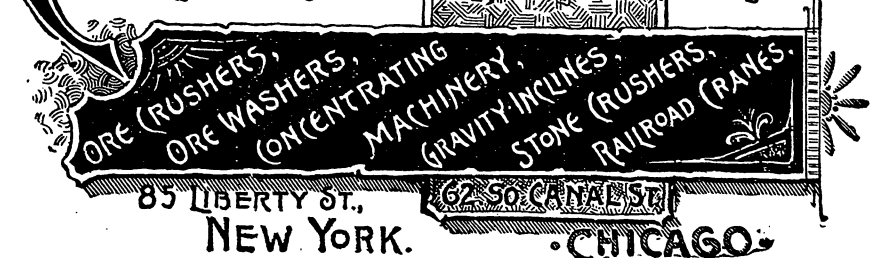
Twenty-second and Wood Sts., Philadelphia, Pa.

Shafting, Gearing, Self-Oiling Bearings, Friction Pulleys, Elevators.

Rope Transmission; Sheave Wheels, any size required, for Hemp, Manila and Cotton Rope Driving. Looms, Cotton and Woolen Machinery for Winding, Spooling, Reeling, Beaming, Warping, Dyeing, Sizing, Scouring, &c.

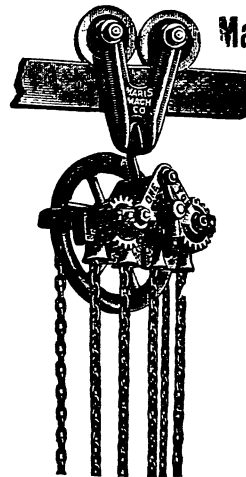
COPELAND & BACON

HOISTING & WINDING ENGINES



85 LIBERTY ST.,
NEW YORK.

62 SO. CANAL ST.
CHICAGO.



Maris & Beekley, PHILA., PA.

MANUFACTURERS OF

CRANES,

Power Bridge
Cranes, Hand
Bridge Cranes,
Jib Cranes.

Portable Hoist.
Holds load at any
point.

Overhead Track,
Trolleys,
Switches.

World's Fair, Machinery Hall, Section 26, Column O-30.

J. G. SPEIDEL,

807 & 809 CHERRY STREET,

READING, PA.,

Patentee and Manufacturer of the

celebrated

Economic Safety Hoist.

500 to 30,000 Lbs. Capacity.

Has been awarded the John Scott

Medal and Premium by the Franklin

Institute of the City of Philadelphia

for Highest Efficiency, Simplicity and Durability.

One man can lift two to three times

as fast as with any other self-holding

chain hoist. It has two speeds, is

built strong and durable, and guaranteed to give satisfaction.

TRAVELING AND SWING CRANES up

to 30,000 lbs. capacity and 50 ft. span.

Overhead Framway, with Trolleys,

Switches, &c. Elevators and

Special Hoisting Machinery.

Illustrated Cat. and Prices on

application.



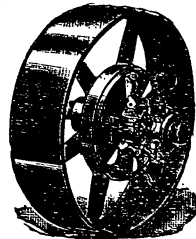
The Moore & White Co.,

Paper

Machinery,

Friction

Clutches, &c



Clutch Pulley.

N. E. Cor. 15th AND LEHIGH AVE.,
PHILADELPHIA, PA.

FOR SALE.

Punching and Shearing Machinery

Hand and Belt Power.

Boiler Makers' Rolls.

NEW DOTY MFG. CO.,

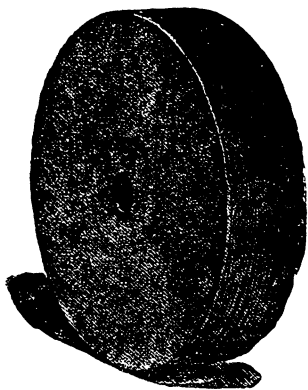
Janesville, Wisconsin.

NORTON EMERY WHEEL COMPANY.

Illustrated CATALOGUE free upon application.

Over **100,000** Wheels in Stock.
WORCESTER, MASS.

Solid Leather Wheels FOR POLISHING.



Will outwear any other wheel
Saves the continual expense of
recovering. Pliable and elastic.
Waterproof and will not burst

C. E. LE MASSENA & CO.,
776 Broad Street, NEWARK, N. J.

"INDEPENDENT OF ALL COMBINATIONS."

THE
Huron Grindstone Co.,
Port Austin, Mich.

MANUFACTURERS OF
Lake Huron Grindstones.
Mounted Grindstones.
Scythe Stones, &c.

WRITE FOR PRICES.

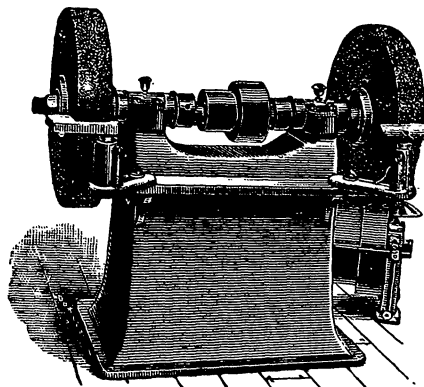
A POOR OIL STONE IS WORTHLESS.



PIKE'S

Lily White Washita is
Warranted to give
satisfaction.

THE PIKE MFG. CO., PIKE STATION, N. H.



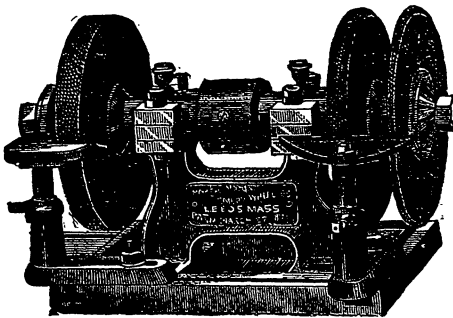
The Springfield Emery Wheel Co.,
Bridgeport, Conn.
Western Agency, 125 So. Clinton St., Chicago, Ill.

EMERY AND CORUNDUM WHEELS,
To Run WET or DRY.

Over 50 Different Sizes of
Dry Grinders,

And over 200 different varieties of Emery
Wheel Machinery. All goods guaranteed
satisfactory.

SEND FOR CATALOGUE.



ESTABLISHED 1867. CAPITAL \$100,00

Northampton Emery Wheel Co.,
LEEDS, MASS.

And 20 South Canal St., Chicago,
MANUFACTURERS OF

EMERY WHEELS

AND
EMERY WHEEL MACHINERY

Of Best Quality.

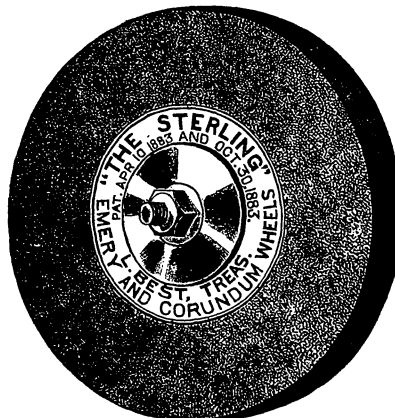
Send for Catalogue. FACTORY AT LEEDS, MASS

IT'S
TO **Your Advantage**

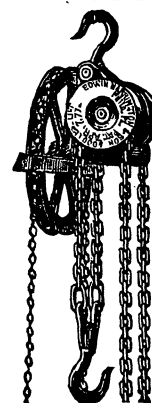
to correspond with
us regarding emery
wheels.

Grant Corundum Wheel Mfg. Co.
WORCESTER, MASS.

Sterling Emery Wheel Company, 174 Fulton St., N. Y.
FACTORIES:
Tiffin, Ohio, and West Sterling, Mass.



The Practical Polish and Varnish Maker.
By H. C. STANDAGE. A treatise containing 760 re-
ceipts and formulae for the manufacture of var-
nishes, polishes, &c. 12mo, cloth.....\$2.50
For Sale by DAVID WILLIAMS, 96-102 Reade St., N. Y.



ESTABLISHED 1867.

**E. Harrington, Son
& Co.,**

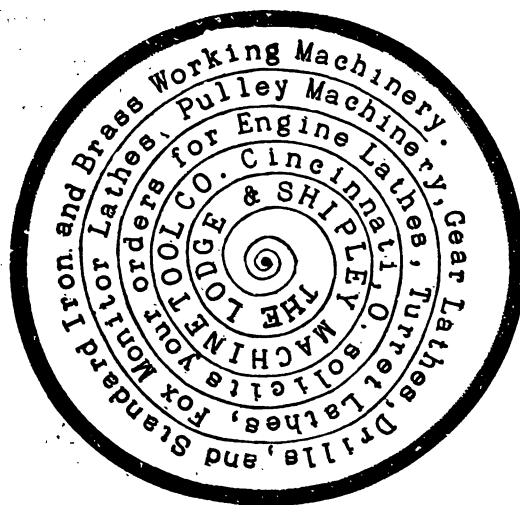
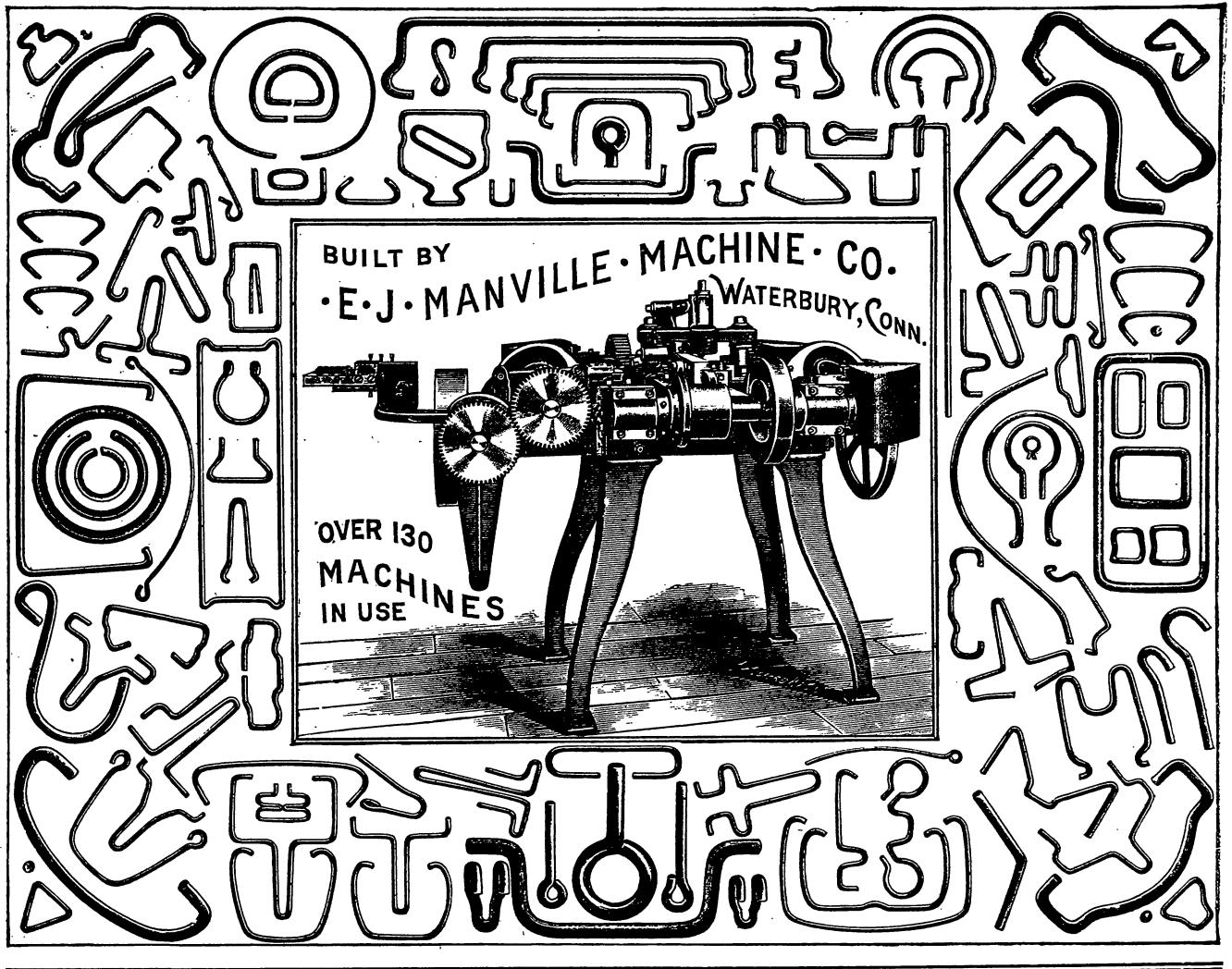
Works and office:
1508 Pennsylvania Ave.,
Philadelphia, Pa.

Lathes, Planers, Drill
Presses, &c. Patent Double
Chain Screw Hoists, Over-
head Tramway-Switch, &c.

Gear Cutting a Specialty.

GEORGE E. BELL,
Successor to E. M. HYDE and UNION STONE CO.,
—SOLE AGENT—

Waltham Emery Wheels,
WALPOLE MILLS TURKISH EMERY.
Dealer in Platers' and Polishers' Machinery and
Supplies of all kinds. Foundry Supplies,
36 JOHN ST., NEW YORK.



World's Fair.

WHEN you visit the Fair, have your mail directed in our care as per address given below. Two mail deliveries are made each day at our display. Every one connected with the

IRON TRADE IS CORDIALLY INVITED,

whether he be our customer, some other man's customer, a creditor or competitor. If you want to write a letter direct from the Fair, WE FURNISH, FREE, Pens, Ink, Paper, Envelopes and Stamps. Don't be afraid to come in and use the office in our display. It is there for that purpose, and you will not be importuned to buy. If you want information about cost of Rooms at Hotels or Private Houses, address our Chicago Store, 68 and 70 South Canal Street.

THE LODGE & DAVIS MACHINE TOOL CO.,

MACHINERY HALL, COLUMN K, 41, 42,
WORLD'S COLUMBIAN EXPOSITION,

CHICAGO, ILL., U. S. A.

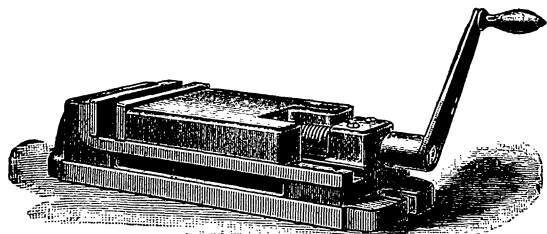
BROWN & SHARPE MFG. CO., PROVIDENCE, R. I.



STANDARD T SLOT CUTTERS.



CIRCULAR MILLING ATTACHMENT.



FLANGED VISES.

The following have been added during the past year to our machines and tools:

- No. 2 Universal Milling Machine.
- No. 3 Universal Milling Machine.
- No. 0 Plain Milling Machine.
- No. 2 Plain Milling Machine.
- No. 3 Plain Milling Machine.
- No. 1 Automatic Screw Machine.
- Circular Milling Attachment.
- Flanged Vises.
- New Sizes Milling Machine Cutter Arbors.
- New Index Plates for Milling Machines.
- New Sets of Tools for Milling Machines.
- New Sizes of Milling Cutters.
- New Sizes of Side Milling Cutters.
- Standard T Slot Cutters.
- New Sizes Special Bevel and Mitre Gear Patterns.
- Micrometer Calipers Nos. 6, 7, 32, 33, 34, 36, 37, 39, 40, 60, 64 and 75.
- Gear Tooth Caliper.

CATALOGUE MAILED ON APPLICATION.

Machinery Hall Annex, Section 13, Crane Columns J 46
and 47 Centre Aisle.
England, Buck & Hickman, 280 Whitechapel Road, London, E.
Germany, C. Diechmann, Ansbacherstr. 5, Berlin, W. 62.

France, Fenwick Freres & Co., 21 Rue Martel, Paris. F. G.
Kreutzberger, 140 Rue de Neuilly, Puteaux (Seine).
Chicago, Ill., Fred. A. Rich, 23 S. Canal St.

BARGAINS

In Second-hand TOOLS.

14 x 5 Windsor Lathe.
16 x 6 Porter "
16 x 6 Bogart "
16 x 6 Lodge & Davis Lathe, with Taper.
17 x 8 Muller Lathe.
18 x 6 New Haven Lathe.
18 x 6 Lathe & Morse Lathe.
18 x 6 Lodge & Davis "
18 x 8 Lodge & Barker "
18 x 8 Flather Lathe.
20 x 8 Steptoe "
20 x 10 Porter Lathe.
21 x 6 Lodge & Davis Lathe.
24 x 16 New Haven Lathe.
25 x 20 Wood & Light Lathe.
36 x 20 Perkins Lathe.
96-in. Triple Geared Lathe.
16 x 6 Reinschagen Turret Lathe.
25-in. Pratt & Whitney Turret Lathe.
18 x 18 x 3 Putnam Planer.
30 x 30 x 5 Cove Planer.
15-in. Lodge & Davis Crank Shaper.
24-in. " " " Geared "
26-in. " " " " "
32-in. " " " " "
5-ft. Plain Radial Drill.
80 and 40 lb. Helve Hammers.

The Lodge & Davis

Machine Tool Co.,

WORKS, Cincinnati, Ohio.

NEW YORK HOUSE, 110 Liberty St.
CHICAGO HOUSE, 68 & 70 So. Canal St.
BOSTON HOUSE, 23 25 Purchase St.
ST. LOUIS HOUSE, 823 No. Second St.
PITTSBURGH HOUSE, Cor. Water and Market Sts.

MACHINISTS' and BOILER MAKERS' TOOLS, NEW and SECOND-HAND, IN STOCK.

Fitchburg Lathes, 14, 16, 18, 24, 30 and 36 in.
Hendey " 14, 16, 18 and 22 in. swing.
Prentice " 12, 14, 16 and 18 in. swing.
Improved " "New Pattern" 24 in. swing.
Powell Planers, 24, 30, 36 and 42 in. wide.
Prentice Drills, 20, 21, 25 and 32 in.
Radial Drills, "New Heavy Pattern" 3, 4 and 6 ft.
Arms. Extra weight and power.
Hendey Friction Shapers, 15 and 24 in. stroke.
Gould & Eberhardt Crank Shaper, 16 in.
Improved Shapers, 15, 22 and 26 in.

BOILER MAKERS' TOOLS.

Bending Rolls, 8 and 10 ft. "Improved Style."
Punch and Shear, 26 and 36 in. gap.
Hor. Flange Punches, All sizes.
Plate Planers, 14 and 8 ft long
Hydraulic Riveter, 8 ft., with complete overhead
Travelling and Hoisting Apparatus. Modern style.
At order.

SPECIAL LIST. SECOND-HAND.

B. & S No. 2 Vertical Turret Chucking Machine.
B. & S No. 5, Screw Machine, with Chasing Bar.
Lincoln Milling Machine.
Upright Boring and Turning Mill, 37 in. swing.
Key Seating Machines, Portable and Stationary, for
Pulleys and Gears.
National No. 3 Double Bolt Cutter, with Dies, &c.
Latest Pattern Extra Heavy, Engine Lathe, 22 in. x
16 ft., complete, with Compound Rest and Cross
Feed. Good as new.
Engine Lathe, 16, 20, 22, 26, 30 and 36 in. swing.
Planers, 22, 24, 28, 30 and 36 in.
Shapers, 6, 8, 9 and 16 in. stroke.

J. J. McCabe,

14 Dey St., New York.

Successor to E. P. Bullard's New York
Machinery Warerooms.

BARGAINS.

Second-hand Machinery. Good Condition.

1 2500 lb. Double Frame Steam Hammer. Frederick
Miles.
1 250-lb Justice & Shaw Dead Stroke Hammer.
1 Iron Planer 32 in. x 32 in. x 11 ft. Double head.
1 Mahoe Planer, 24 in. x 24 in. x 6 ft.
1 36 in. Boring Mill. Ed. Harrington & Son.
1 Cement Engine Lathe, 18 in. x 10 ft.
1 Niles Turret Lathe, 14 in. x 6 ft.
1 40 in. Schumacher Drill Press, B. G. & P. F.
3 28 in. Schumacher Drill Presses, B. G. & P. F.
1 Power Punch; capacity, 1/2 in. hole in 1/2 in. iron.
Punch to the center 12 in. sheet. Parker, Snol &
Co., Fowler patent.
1 20 in. x 48 in. People's Works Horizontal Engine.
6, 8, 10, 15, 25 and 40 H.-P. Hoisting Engines.
1 Davidson Steam Pump, 12 in. x 8 in. x 14 in.
1 Jacob Naylor Roller, 54 in. x 16 ft., full fronts. In-
sured in the Hartford for 100 lbs.

L. F. SEYFERT'S SONS,

437-441 N. 3d St., Philadelphia, Pa.

METAL WORKING MACHINERY.

All kinds.

NEW AND SECOND HAND.

600 Machine Tools in Stock.

Send for lists of Second-hand Machinery and Secure Bargains.

PRENTISS TOOL & SUPPLY CO.,

115 Liberty Street, NEW YORK.

59 South Canal Street, CHICAGO, ILL.

PLANER, 28 in. x 26 in. x 8 ft., table. Good order \$350.00
" 30 in. x 30 in. x 6 ft., with chuck. Re-
built 275.00
24-in. Heavy Shifting Belt SHAPER. New 300.00
LATHE, 18 in. x 10 ft., with chuck. Good order. 160.00
40-in. Heavy DRILL PRESS. Good as new 335.00
26-in. " " " Plain 85.00
21 1/2-in. Heavy Lever Feed DRILL. New 54.00
FORGE DROP, 100-lb. Hammer, New Design. 160.00
WIRE STRAIGHTENER and Cutter, Semi-Aut. 60.00
BOLT CUTTER, New Head and Dies 3/8 to 1 1/2 in. 175.00
7 x 9 ENGINE. Splendid order 85.00
POWER PUNCH PRESSES \$75.00 and upward.
AMER. TOOL WORKS., Cleveland, O.

SECOND-HAND MACHINISTS' TOOLS.

1 Planer, planes 22 ft. 60 in. x 50 in.
1 Planer, planes 15 ft. 42 in. x 42 in.
1 Planer, planes 6 ft. 32 in. x 26 in.
1 Planer, planes 3 ft. 24 in. x 24 in.
1 Planer, planes 5 ft. 24 in. x 24 in., Whitcomb.
1 Planer, planes 5 ft. 24 in. x 24 in.
1 Planer, planes 5 ft. 22 in. x 22 in., old style, cheap.
1 Planer, planes 4 ft. 24 in. x 24 in.
1 Crank Planer, 2 ft. 18 in. x 12 in. Al.
1 Engine Lathe, 18 ft. bed, 32 in. swing, for Boring
and Turning.
1 18 ft. 24 in. Lathe.
1 10 ft. 17 in. Lathe.
1 13 ft. 18 in. Lathe. Good order.
3 6 ft. 14 in. Blaisdell Lathes.
2 6 ft. 15 in. Wood & Light Lathes.
1 5 ft. 14 in. Star Tool Co. Lathe.
1 Pratt & Whitney Cushioned Hammer.
1 36-in. Back Geared New Haven Drill.
1 6 ft. Harrington Radial Drill. Al.
1 20-in. Wheel and Lever Feed Drills.
And various other tools.

NEW YORK MACHINERY DEPOT,
Bridge Store No. 16, on Frankfort St., New York.

FOR SALE.

1 each Garvin No. 2 & No. 4 Milling Machines, 2d hand.
1 22 in. x 11 ft. 6 in. Blaisdell Engine Lathe, " "
1 17 in. x 8 ft. McMahon " " "
1 28 in. x 8 ft. New Haven " " "
1 26 in. Post Drill second hand.
1 each 22 x 8, 10, 12 Engine Lathes, new.
1 each 52 in. and 32 in. Macia Drills, new.
1 each 20 in. "Lever" and "Wheel and Lever" Drills.
1 Baker Bros. Universal Saw Bench new. [new]
1 Pratt & Whitney Lincoln Miller No. 3, 2d hand.
1 80 in. Radial Drill, 2d hand.

THE LODGE & SHIPLEY MACHINE TOOL CO.,
107-118 Culvert St., Cincinnati, Ohio.

FOR SALE.

Fitchburg Machine Co. Vertical Automatic
Engine, cylinder 14 in. x 14 in. A large variety
of second-hand Steam Boiler Feed and Tank
Pumps.
F. McSWEGAN & SONS,
Dover St. and Franklin Square N. Y.

GOOD Second-hand TOOLS

FOR Quick Delivery.

12 in. x 6 ft. Blaisdell Screw Cutt'g Engine Lathe.
14 in. x 6 ft. Fitchburg " " " "
15 in. x 4 ft. " " " "
16 in. x 6 ft. " " " "
16 in. x 8 ft. " " " "
16 in. x 8 ft. Flather " " " "
16 in. x 8 ft. Dexter " " " "
17 in. x 6 ft. Fitchburg " " " "
17 in. x 8 ft. " " " "
18 in. x 8 ft. " " " "
19 in. x 8 ft. " " " "
20 in. x 7 ft. Flather " " " "
20 in. x 10 ft. Fitchb'g " " " "
20 in. x 9 1/2 ft. Pond " " " "
22 in. x 10 ft. Flather " " " "
22 in. x 16 ft. Fitchb'g " " " "
24 in. x 8 ft. " " " "
27 in. x 12 ft. " " " "

No. 1 Fitchburg Upright Drill, 19 1/2 in. swing.
Prentice Upright Drill, 25 in. swing, back gear,
power feed.

No. 3 Fitchburg Upright Drill, 32-in. swing,
back gear, power feed.

6 ft. Fitchburg Radial Drill.

10 in. x 5 ft. Fitchburg Speed Lathe.

13 in. x 6 ft. " " " "

17 in. x 8 ft. " " " "

18 in. x 6 ft. " " " "

20 in. x 12 ft. " " " "

20 in. x 16 ft. " " " "

36 in. x 6 ft. " Polishing Lathe.

24 in. x 8 ft. " Chucking "

No. 0 Fitchburg Shaper, 12-in. stroke.

36 in. Gould & Eberhardt Gear Cutter.

36-in. Putnam Machine Co. Gear Cutter.

22 in. x 22 in. x 5 ft. Whitcomb Planer.

25 in. x 25 in. x 8 ft. Fitchburg Planer.

28 in. x 26 in. x 10 ft. " " "

60 in. x 50 in. x 24 ft. " " two heads
on cross beam.

Address

PENNSYLVANIA
MACHINE CO.,
LIMITED,
29 & 31 N. Seventh St.,
PHILADELPHIA, PA.

FOR SALE—SECOND-HAND.

3 Upright Corliss Boilers, 150 H.-P. each.
1 Locomotive Fire Box Boiler, 50 H.-P.
1 16 x 36 in. Slide Valve Engine.
1 14 x 42 Greene Engine.
1 16 x 42 Babcock & Wilcox.
Large assortment of Knowles, Blake and
Worthington Steam Pumps. Write for prices
and full description to
D. B. CRUICKSHANK,
Providence, R. I.

SECOND HAND.

84 in. x 84 x 16 1/2 ft. Planer, three heads,
Niles Tool Works. Al.
90 in. x 20 ft. Engine Lathe, triple
geared, screw feed. Good order.
80 in. x 18 1/2 ft. Engine Lathe, triple
geared, screw feed. Good order.
88-in. Driving wheel Lathe, turns two
wheels at one time. Good order.

GEORGE PLACE MACHINE CO.,
120 Broadway, New York.

WANTED.

One 10 x 10 and also one 10 x 12 or 13 x 12
Furnace Hoisting Engines; either the Otis or
Crane type. Address

ROANE IRON CO., Rockwood Tenn.

Great Bargains

Must be Sold and Removed.

- 16 in. x 30 in. Horizontal Engine.
18 in. x 36 in. Horizontal Engine.
24 in. x 36 in. Horizontal Engine.
19½ in. x 48 in. Beam Engine, with Knowles Condenser.

Write us for what you want.

LOVEGROVE & CO.,

Third and Quarry Sts., Philadelphia, Pa.

SECOND-HAND MACHINERY.

- One Pond Machine Tool Co. Iron Planer, 40 in. x 40 in. x 24 ft., with two heads. In fine order.
One Belden 100-lb. Upright Power Hammer.
One 60-lb. Bradley Helve Hammer.
One American Tool Co. No. 2 Cabinet Turret Lathe, with slide rest. In fine order.
One Pratt & Whitney 36-in. Gap Chucking Lathe.
One Pratt & Whitney No. 3 Lincoln Miller. In fine order.
One Iron Planer, 52 in. x 44 in. x 12 ft., with two (2) heads.
Send for circular of Second-hand Machinery in stock.

HILL, CLARKE & CO.,

156 Oliver St., Boston, Mass.
12 and 14 South Canal St., Chicago, Ill.

MUST BE SOLD and REMOVED AT ONCE.

The entire equipment of the United Electric Traction Company of Marion, N. J., comprising:

- 31 Engine Lathes, from 14 in. to 48 in. swing.
15 Hand Lathes, from 10 in. to 20 in. swing.
6 Planers, from 24 in. x 5 ft. to 32 in. x 12 ft.
6 Shapers, from 15 in. to 20 in. stroke.
13 Drill Presses, all sizes up to 32 in. swing.
8 Milling Machines, Plain and Universal.
2 Brown & Sharpe Screw Machines.
1 Large Newton Slotting Machine.
1 Large Radial Drill Press.
8 Gould & Eberhardt Automatic Gear Cutters, 36 in., 48 in. and 60 in.
1 Betts Machine Co. Large Horizontal Boring Mill.
1 No. 2 Diamond Universal Grinding Machine.
2 Large Bliss Power Presses.
Also Tool Grinders, Die Sinkers, Tapping Machines, Bolt Cutters, and Large Pattern and Blacksmith Shop Equipments.
These tools are all in A1 condition and of the very best makes in this country. They will be sold at remarkably low prices, and must be disposed of at once. Call at our salesroom and inspect them, or write for complete descriptive circular and price-list.

THE GARVIN MACHINE CO.,
Laight and Canal Sts., New York.

FOR SALE CHEAP.

- One 12-ton Harrisburg Steam Street Roller.
One 20-ton Allen-Porter " " "
One 20-ton Ross " " "
One Locomotive, 3-ft. gauge.
30 Side Lump Cars.

DAVIS, KELLY & CO.,
"The Commerce," Louisville, Ky.

SNAPS.

- Lot Sellers Bolt Cutters; cheap to close out.
Lot Eclipse Pipe Cutters; low priced and efficient.
Lot Steam Pumps, single and duplex; standard makes; perfect order.
80 H.-P. Upright Boiler; a rare bargain.
250 H.-P. Vertical Corliss Engine; as good as new.
And hosts of other things.

THOS. P. CONARD,

206 Walnut Place, Philadelphia, Pa.

FOR SALE. SECOND-HAND PUMPS

- Smith-Vaile Compound Duplex, 14-20 x 15 x 15.
Worthington " 10-16 x 10¼ x 10.
Blake " 7-16 x 7 x 16.
Guild & Garrison, 24 x 24 x 24.
Davidson, 24 x 12 x 12.
Blake, 24 x 18 x 24.
Davidson, 14 x 8½ x 14.
Cameron, 14 x 9 x 18.
Worthington Duplex, 14 x 8½ x 10.
Deane, 14 x 7 x 14.
Davidson, 12 x 10 x 12.
Guild & Garrison, 12 x 7 x 12.
Niagara, 12 x 7 x 12.
Worthington Duplex, 10 x 6 x 10.
Deane Duplex, 9 x 5½ x 10.
Send for list of machinery on hand.

MARVIN BRIGGS,

12 Broadway, New York.

SECOND-HAND MACHINERY.

- Boring Mill, 10 ft. 4 in. swing, 56 in. under cross rail, table 7 ft. 6 in. in diameter.
Boring Mill, 8 ft. 4 in. swing, 48 in. under cross rail, table 6 ft. 6 in. in diameter, two heads on cross rail.
76-in. Planer, 13 ft. long; heavy and powerful.
48-in. Car Wheel Borer.
Axle Lathe.

Write for photographs and further particulars.

Eastern Branch,

NILES TOOL WORKS CO.,

138 Liberty St., New York

MACHINERY, TOOLS, &c.

IN STOCK, LARGE LINE OF NEW AND SECOND-hand engines, boilers and machinists' tools for sale or exchange. Let me know your wants and what you have for sale or exchange. Below are some special bargains:
100 H.-P. Corliss Engine. 60 H.-P. Atlas Automatic engine.
20 H.-P. to 60 H.-P. plain slide valve horizontal engines.
2 H.-P. to 50 H.-P. vertical engines.
2 H.-P. to 10 H.-P. Baxter engine boilers.
6 H.-P. and 10 H.-P. hoisting engines with boilers.
1, 2, 4 and 6 H.-P. yacht engines.
4 H.-P. and 7 H.-P. gas engines.
4 50 H.-P. portable boilers.
50 H.-P. and 100 H.-P. locomotive boilers.
10 H.-P. to 100 H.-P. horizontal and vertical boilers.
20 screw-cutting lathes of different sizes.
Several rod-feed turning lathes.
Milling machines, gear cutters.
6 in., 12 in. and 15 in. shapers.
24 in. and 36 in. planers.
44 in. radial drill, 1¼ National bolt cutter.
No. 3 Fowler press, 2 10 in exhaust heads.
25 lbs. Bradley and 10 lbs. Hotchkiss Hammers.
Catalogues.
Frank Toomey, 131 N. Third St., Philadelphia, Pa.

SOME BARGAINS HERE.

- 1 Hendey Shaper, 15 in. stroke, imp. vise; new.
1 14 x 6 Screw Cutting Engine Lathe; new.
4 H.-P. Comb. Engine and Boiler. Fine condition.
Hendey Cutting-off Machine. New.
1 3-Spindle Garvin Drill Press, used 1 month.
30 x 13 Pond Lathe. Good condition.
72 x 72 x 20 Planer 2 Cross heads.
1 75 H.-P. Westinghouse Automatic Engine.
1 20 H.-P. Erie City Boiler. good condition.
Also variety of Engines, Boiler Pumps, &c.
And other machinery, new and second hand. Write for prices. **Machinists' Supply Company,**
89, 41 and 43 Central Ave., Rochester, N. Y.

FOR SALE.

Jobbing Iron Foundry, in center of manufacturing district; within 1 mile of Court House, Chicago. Address
BOX 154, Rogers Park, Ills.

Iron Tanks, Hydraulic Press, Corliss and other Automatic Engines, Slide Valve Engines, Boilers, Steam Pumps, etc., etc.

TANKS.—Rendering Tanks, Square Tanks, Round Tanks, and Pans; from Soap Works, cheap before removal.

HYDRAULIC PRESS, 600 to 800 tons, with R. Hoe & Co. Air Pump for same.

CORLISS ENGINES, 80 x 72, 80 x 60, 80 x 48, 23 x 36, 10 x 24, and other sizes; also other Automatic and Slide Valve Engines.

Two **WESTINGHOUSE ENGINES,** 60 and 25 H.-P.

HORIZONTAL BOILERS, 5½ x 16, 5½ x 14, 5½ x 10, 5 x 18, 4½ x 12, and others. Brennan Crusher, 8 x 25. Bogardus Mill. Ingersoll Rock Drill. Woodward Double Fire Pump, 1000 gallons. Worthington Duplex Pump, 25 x 12 x 24. Four-side Wood Planer and Matcher. Also assortment of Steam Pumps.
Send for catalogue.

C. M. CLAPP, 74 Cortlandt St., N. Y.

!!! FOR SALE !!!

BAKER BLOWERS, Nos. 1, 4½, 5, 6 and 7.
ROOT BLOWERS, Nos. 1, 2, 3, 4, 5, 6 and 7.
Sturtevant Blowers, Nos. 4, 5, 6, 8, 2.
1 Corliss Band Wheel, 13 ft. x 24 in. in halves.
A Variety of Machinery, such as Boilers, Engines, Pumps, Crushers, &c., very cheap.
Do you want to buy or sell Machinery? If so, write
C. R. BIGELOW, Machinery Expert,
45 Dey St., New York City.

LARGE ENGINES.

We have for sale cheap:
One 300 H.-P. Gummer Horizontal Engine, complete.
One 250 H.-P. Slide Valve Horizontal Engine, complete.
Must be moved at once. Address
G. W. SCHULTZ & CO.,
308 Walnut St., PHILADELPHIA.

MACHINE TOOLS, New and Second-hand, For Sale.

Hendey's "Morton" Screw Cutting Lathes. Cut 12 threads without changing any gears. 36 speeds for the side feed.
Garvin Screw Machines.
Dwight Slate Sensitive Drills.
A line of second-hand Tools, also small Electric Fan Motors.

DANIEL KELLY,

51 N. 7th St., Philadelphia, Pa.

WANTED.

Buyers for 28 Typewriters, standard makes, low prices also; for 50 new letter presses, \$3, all guaranteed. I want laundry machinery, gas engines, etc.; also specialties to push. If you wish to buy or sell write

H. H. MANSFIELD,

126 Liberty St., New York.

For Sale, Cheap LOCOMOTIVES AND CARS.

Standard and narrow gauge boarding, box, coal, flat, refrigerator and passenger Cars. Also large quantities of relaying and scrap rails, car wheels and scrap, pig iron, muck bars, &c.

G. H. SIBELL & CO.,

62 and 64 Michigan Ave., Chicago, Ill.

ENGINES.

For sale at half price, if sold at once, one 350 horse-power and one 200 horse-power Automatic Cut-off Engines. Also one 70 horse-power Torotting Engine. These engines are guaranteed; they are finished at the shops and ready for immediate delivery. Address

"HALF PRICE,"

office of *The Iron Age*, 96-102 Reade St., N. Y.

I offer 3 20 in. x 24 in. Improved Straight-line Ingersoll-Sergeant Air Compressors

built in 1890, and used only seven months at St. Clair Tunnel. Ready for delivery and in first-class condition.

1 24 in. x 60 in. Left-hand Harris-Corliss Engine. May be seen running

F. W. IREDELL,

Havemeyer Building, 26 Cortlandt St., New York.

RECEIVER'S SALE.

The plant of the **MOTHERWELL IRON & STEEL CO.**, situated at Logan, Ohio, on the C. H. V. & T. R. R., is offered for sale. The buildings consist of one brick building, 165 x 50, one half being three stories, the other half one story; a one-story frame grinding room, 67 x 43; a brick foundry, 43 x 51; a two-story brick warehouse, 60 x 35; a two-story corrugated iron warehouse, 24 x 35; a one-story wareroom; brick office, and sheds and out buildings. The machinery is in good order and consists of two engines and boilers, one planer, two lathes, three drill presses, one bolt cutter, four punching and shearing machines, two 1000-lb. steam hammers, three trip hammers, one Bradley hammer, two lift drop hammers, 15 grinding machines, with many dies, patterns and other tools necessary to operate a foundry and machine shop and continue the manufacture of steel plow shapes and a line of agricultural implements which has had a large sale. The grounds contain about 2½ acres, with vacant land adjoining which can be bought at a low price. Labor is cheap; coal within seven miles, and local capital is ready to join with an experienced and successful manufacturer to purchase and operate the works. This property can be secured at a great bargain. For further information address

F. C. ROCHESTER, Receiver,
Logan, Ohio.

AUDITOR'S NOTICE.

Assigned Estate of the Bristol Rolling Mill Company.

The undersigned Auditor, appointed by the Court of Common Pleas of Bucks County for the purpose of passing upon the exceptions to the account of, and making distribution of the fund in the hands of A. Weir Gilkeson, Assignee in trust for the benefit of the creditors of The Bristol Rolling Mill Company, hereby gives notice that he will meet all parties interested at his office, in the borough of Doylestown, Pa., on Thursday, the 3d day of August, A.D. 1893, at 10 o'clock a.m., for the purpose of attending to the duties of his appointment. Creditors will please send statements of their claims to the undersigned.

HENRY O. HARRIS, Auditor,
Doylestown, Pa.

CORRUGATED IRON.

Wanted to buy carload cheap. Address, with prices, &c.,
"IRON,"
office of *The Iron Age*, 96-102 Reade street, New York.

FOR SALE.

Two Tubular Boilers, 48 in. diameter, 16 ft. long, with fronts, grate bars and fittings complete. **Also one Double Deck Tubular Boiler**, without settings. All guaranteed for 90 lbs steam. Apply to

MARSHALL BROS. & CO.,
1156 Beach St., Philadelphia, Pa.

FOR SALE OR RENT.

The best location in Connecticut for Hardware manufacturing; finely situated. One line of railroad. For particulars address

BOX 1025,
Hartford, Conn.

RARE OPPORTUNITY.

For reason of increasing business at our main store, will sell one of our branch stores, established six years; carrying a general stock of Hardware, Stoves, Tinware, Agricultural Implements, &c. located in a thriving town, at which is located the most extensive coal mines in the State. Pay roll to mines for June \$2,000. Doing good business at good profits. Rare chance for a live man to make money on moderate capital. Address

A. L. BABCOCK HARDWARE CO.,
Billings, Mont.

FOR SALE.

The Tapping Machinery, Patterns and Core Boxes of the late Cossack Malleable & Gray Iron Co., consisting of: 1 Eaton, Cole & Burnham 3 way machine, tapping 2 in.; 1 Foster 3-way machine, tapping 1 in.; 1 Foster 1-way machine, tapping 1¼ in.; 3 Newbury 3 way machines, tapping 1½ in. Will be sold separately or all together. Address
J. G. NEWBURY, Cossackie, N. Y.

RECEIVERS' SALE.

The Receivers of the Maryland Manufacturing Company, appointed by Circuit Court No. 2 of Baltimore, Maryland, will sell at private sale cheap the entire plant, buildings, &c., of said company, consisting of two brick manufacturing buildings on a lot 80 x 90 feet, subject to a ground rent of \$480 per annum; 14 rivet machines, complete machine shop, electric light plant and all machinery and appliances to make complete line cold pressed rivets. Capacity about 3 tons per day. Ready for immediate operation. Apply to

WILLIAMS & WILLIAMS,
Attorneys for Receivers,
Equitable Building, Baltimore, Md.

WANTED.

First-class Builders' Hardware firm in each city to take the exclusive agency for Howarth's Patent Sash Centers. Ten hundred and sixty sets have been used on one building. Architects are specifying them repeatedly; over 100 buildings have been supplied. Large discounts. Address

Howarth Reversible Sash & Sash Center Co.,
Detroit, Mich.

Any Company

contemplating the expenditure of a large amount in the establishment of a manufacturing industry, requiring the use of a thoroughly equipped Machine Shop, Boiler Shop, Foundry and Smith Shop plant, well located on competing trunk lines of railroads and in a good labor market, is invited to address

STIMSON, WILLIAMS & CO.,
Bryant Building, 55 Liberty St., New York.

FOR SALE OR RENT.

Manufacturing Property.

Having purchased the Auburn Manufacturing Company's plant, with greater facilities for manufacturing carriage forgings, which my increasing trade demands, I offer my former plant for sale or rent, which consists of two-story stone and wood building, 60 x 30, and three-story stone and brick building, 75 x 40. Also forge shop, 22-ft. posts, 150 x 54, with large double windows between each bent. 50 x 30 boiler house. Splendid water power, 11 ft. head.

One 64-in. American Turbine.
One 24 in. Little Giant Turbine.
200 ft. 2¾ Cold Rolled Iron Shafting.
40 ft. 2¼ Cold Rolled Iron Shafting.
60 ft. 2-in. Cold Rolled Iron Shafting.
Furnished with self-oiling boxes, Water wheel governor; 4-ton Buffalo Scales. The premises cover about 2½ acres. Shipping facilities of the best. Located near N. Y. Central and Philadelphia and Reading depots. Will be sold cheap and on easy terms or rented. For particulars address

RICHARD ECCLES, Auburn, N. Y.

WANTED.

Responsible parties to manufacture and sell on royalty, a cheap portable steel or iron **CULVERT BRIDGE**; it is adapted to all small streams, runs, etc., in roads, streets, **RAILROADS**, etc.; improved roads is the order of the day; use this bridge, put it below the level of the road, cover it over and thus prevent jarring and wear and tear of vehicles, etc. Apply to

W. A. NICHOLS,
Girard Building, Philadelphia, Pa.

WANTED.

A machine to perforate tin sheets for IC and IX tin, 14 in. x 20 in. or longer, perforating round holes from No. 1 to No. 7 inclusive. We will receive bids for a machine of the latest improved style, to perforate and finish such sheets. Or would like to hear from a man who can make such improved machine and can run the same. Address "PERFORATING," office of *The Iron Age*, 96-102 Reade St., N. Y.

WANTED.

To furnish reasonable estimates on specialties in light metal work.

CLARK & COWLES, Plainville, Conn.,
Manufacturers of Clock Trimmings, Rivets,
Springs &c.

BICYCLE MANUFACTURING PLANT FOR SALE.

Located in a prominent Western city and adapted to the manufacture of bicycles of any grade. Capital required, \$75,000 to \$100,000. Good orders for season of 1894 assured. For particulars apply to

THE R. M. CO.,
P. O. Box 31, Cincinnati O.

FOR SALE TO CLOSE AN ESTATE.

Fine Hardware, Stove, Tinware and Plumbing Business.

In a growing Western town; doing a first-class retail and jobbing business. Stock will inventory about \$85,000. A rare chance, as present owners have been liberal advertisers. Only those who mean business need apply. Address
"M. & M.,"
office of *The Iron Age*, 96-102 Reade St., N. Y.

Collections?

ATTENTION! Merchants and Manufacturers.—We collect your past due accounts. Do not let them remain too long upon your books. Our terms just and fair.

THE HARDWARE BOARD OF TRADE, Ltd.,
4 and 6 Warren street, New York.
JAS. H. GOLDEY, Treas.

CHARLES WEILAND.

I make a special business of buying and selling Job Lots of

HARDWARE AND CUTLERY.

Tools and Second Quality Files a Specialty.
Send for Catalogue.

143 Chambers St., New York.

A RARE OPPORTUNITY.

Wanted, a thoroughly competent and reliable hardware man to purchase a part of the interest of one of the owners in a wholesale and retail hardware business. The house does a business of over \$300,000 yearly. Located in a city of over 100,000 population. Has several salesmen on the road. Business established in 1875; incorporated with paid up capital of \$150,000. Reason for selling a part of the stock, ill health. To a party who is capable and satisfactory, an interest in the business can be obtained, and be placed in an important office in the corporation with salary. Address

S., Post Office Box 237, Topeka, Kansas.

Any Manufacturer

of Hardware or Machinists' Specialties desiring to be represented in New York City and vicinity, will find it to his interest to address

E. J. HUSSEY & CO.,
80 John St., New York.

We are centrally located, active workers and can furnish best of references.

EUGENE BISSELL, Auctioneer.

E. BISSELL, SON & CO.,

Successors to
HAYDOCK & BISSELL,
WHOLESALE

HARDWARE AUCTIONEERS,

12 Murray St. and 15 Park Place, N. Y.

Sales held weekly for the trade. Consignments solicited. We refer to the leading manufacturers and importers.

LUXURY ON WHEELS.

The "Electric" trains of the Cincinnati, Hamilton & Dayton R. R. and "Monon" Route between Cincinnati and Chicago are provided with the latest product of the Pullman Co. built expressly for this service. There are 10 compartments in each car, which may be converted at will into complete drawing rooms, most beautifully and harmoniously decorated, lighted by the Pintsch gas system, and are positively the most modern equipped sleeping cars in the world. This is the only line running Pullman Vestibule and Dining Cars between the cities named. THE World's Fair Route. See that your ticket reads C., H. & D. and Monon Route.

E. O. McCORMICK, G. P. & T. Agent,
Cincinnati, O.

PLAIN CASTINGS,

Weighing from 5 to 20 pounds each, can be bought at low prices for delivery during summer. Write for prices, naming quantity, and send sample of what is wanted.

WRENN, WHITEHURST & CO.,
Norfolk Va.

REMOVAL.

The Frasse Company,
after occupying their old stand at 92 Park Row for upward of 50 years, have removed to 19 Warren St., near Broadway, where they will carry a large and varied assortment of Tools for every branch of the Mechanical Trades. A specialty is their line of Cycle Repairers' Tools. Chesterman Tapes, Stub's Goods and Fischer Files are some of the specialties they sell.

YOU Can Tin Cast Iron as readily and cheap as Malleable Iron.

The Flanders process for tinning cast iron is now an assured success and is in use by some of the largest firms in the country. Correspondence solicited for the erection of galvanizing or tinning plants. Mr. W. T. Flanders will continue to superintend the building and starting of all plants. Address

THOS. SANDS,

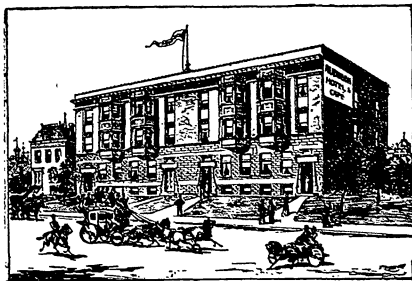
Nashua, - - - N. H.

Wanted, Contracts

For building mining, blast furnace, rolling mill and factory machinery, for making castings for cable and electric railroads, or any special line of castings. Address

MAHONING FOUNDRY AND MACHINE SHOP

Danville, Pennsylvania.



AUDUBON HOTEL.

Stone and Brick. Electric Light.
Permanent and Safe.

Midway Plaisance (or 60th St.)
and Oglesby Ave.

HARDWARE HEADQUARTERS.

Montross & Coolidge, Proprietors, Chicago.

Chicago References:

Commercial National Bank, Markley, Ailing & Co.,
Orr & Lockett Hardware Co., Fraser & Chalmers,
Illinois Trust and Savings Bank,
OR ANY DEPARTED GUEST.

With 125,000 daily average attendance at the Fair, the advantage of hotel accommodations near Jackson Park has become a necessity. Two hours' time is saved daily, besides expense and crowding in transportation. Do you realize this time and expense means the saving in time and cost of more than an entire day in each week. The Audubon is beautifully located, with a Midway Entrance a block on either side. The Audubon is owned and controlled by Hardware men who have business interests and friends to protect in its management, being dependent on their good will in other lines of business. Prices are reasonable.

ROOMS \$1.50 and up Per Day.

Our Café has grown famous through moderate charges and first-class service.
To make engagements (no advance payment required) write to

N. H. HENCHMAN, Jr., Mgr.,
60th St. and Oglesby Ave.

C. F. RICE,

206 So. Green St., - - CHICAGO.

Largest wholesale house in America for
Mirrors of all kinds, Pictures, Mouldings,
Frames, Brackets, Easels, Screens and
kindred goods. Large illustrated catalogue sent to Dealers upon application.

\$99.50 FREE.

For 50c. I will send you a pamphlet containing 50 well written advertisements, each of which is worth easily \$2.00. If you want to catch the trade of your town send 50c. in stamps and get pamphlet by return mail.
Thousands already in use.

J. A. DUFFY, - 118 Main St., Hannibal, Mo.

NEW ENGINE LATHES For Sale Cheap.

13 in. }
15 " } ANY LENGTH
17 " } OF BED.
20 " }
22 " }

Draper Machine Tool Co.,

Successors to

LATHE & MORSE TOOL CO.,

130 Gold Street. WORCESTER, MASS.

BLOWING ENGINE FOR SALE

Vertical pattern, with balanced steam slide valve gear, steam cylinder 14 in. diameter, air cylinder 40 in. diameter, stroke 24 in. 1 to 100 strokes per minute; engine new.

JAMES LEFFEL & CO., Springfield, Ohio.

SITUATIONS WANTED.

Undisplayed Advertisements for
Situations Wanted not exceeding fifty
words Fifty Cents each insertion.
Additional words one cent each.

CHEMIST.—A position with an iron company; thoroughly experienced in the analysis of iron ores, pig iron and steel; good references. Address "SILICON," office of *The Iron Age*, 96-102 Reade St., New York.

BLAST FURNACE MANAGER desires an engagement; competent and experienced in construction and operation; familiar with various ores and fuels and all mechanical as well as metallurgical details, practically as well as theoretically. Address "C. AND O.," No. 713, office of *The Iron Age*, 96-102 Reade St., N. Y.

MECHANICAL DRAFTSMAN, Swede, technical graduate, wants position; four years' experience in steam engines, hydraulic cranes and general machinery in this country. Address "GRADUATE," office of *The Iron Age*, 96-102 Reade St., New York.

MECHANICAL ENGINEER of several years' experience, resident of Chicago, with extended acquaintance among business men, good address, strictly sober, desires to represent manufacturers of steam and power machinery, hoisting and pumping machinery or railway appliances. Address "REPRESENTATIVE," office of *The Iron Age*, 59 Dearborn St., Chicago.

TRAVELING MAN, five years' acquaintance with wholesale hardware and woodenware trade east of the Missouri River, desires two or three staple lines on salary or commission; New York agency preferred; unquestionable references. Address "DANFORTH," office of *The Iron Age*, 96-102 Reade St., New York.

BY COMPETENT MAN with large trade and extended acquaintance, position to represent or travel for a mill making bar, sheets, billets, &c. Address "COMMERCE," office of *The Iron Age*, 220 South 4th St., Philadelphia.

AS SALESMAN, in or outside trade (hardware), having had 17 years' experience in a saw factory and eight years' in hardware house (especially tools); understand mechanical drawing; 38 years of age. Address GEO. LIM-KNY, care of George L. Norris, 222 West Second St., Wilmington, Del.

AS MANAGER or Assistant in open hearth steel works or steel foundry; 20 years' experience in manufacturing steel of all grades and furnace and general rolling mill construction; understand making soft, sound steel castings and manganese steel; best of references. Address "SOFT CASTINGS," office of *The Iron Age*, 59 Dearborn St., Chicago, Ill.

TO ANY ONE wishing to engage in the manufacture of mild crucible steel castings on a small or medium scale, I will furnish the full process, including furnaces, mixtures of steel, and facing-sand process of molding; will start plant if necessary; steel warranted perfectly sound. For samples and references address "STEEL," office of *The Iron Age*, 59 Dearborn St., Chicago.

AS MANAGER BESSEMER STEEL WORKS.

The advertiser, John Facer, late of Hampton & Facer's Special Steel Works, Maryport, England, wishes to meet with a situation. He understands all tempers of carbons, silicon and manganese from tin bar upwards, and has had 30 years' practical experience. Address office of *The Iron Age*, 220 South 4th street, Philadelphia.

CHEMIST, favorably known in iron and steel circles, with a thorough metallurgical education and large experience in the manufacture of steel, blast furnace and foundry work, and who has a reliable method for the grading of foundry irons, is open to an engagement, preferably with a large furnace company. Address "METALLURGIST," office of *The Iron Age*, 96-102 Reade St., New York.

FURNACE FIRE BRICK LAYER, with 15 years' experience, wishes a situation in a puddle, plate or sheet mill; understands building all kinds of furnaces and setting boilers; references given. Address "W. H. H.," Box 76, office of *The Iron Age*, 96-102 Reade St., N. Y.

MECHANICAL ENGINEER or Chief Draftsman; experienced in pattern shop, foundry and machine shop practice, structural iron work, hydraulic and general engineering, superintendence, &c.; now open for engagement. "WORKER," office of *The Iron Age*, 96-102 Reade St., New York.

AS SUPERINTENDENT or Foreman in open-hearth steel plant; well up in all grades of steel, and can give the best of references as to ability, experience and steadiness; will be open for engagement in six weeks. Address "HEARTH STEEL," office of *The Iron Age*, 96-102 Reade St., New York.

AN EXPERIENCED hardware Salesman desires a position to travel in the South for hardware jobber or cutlery manufacturer; references furnished; open for contract beginning September 1, 1893. Address Box 29, Concord, North Carolina.

AS FOUNDRY FOREMAN: am well up in all foundry practice; have had large experience in the handling of men; am strictly temperate; references present employers. Address Box 100, Leeds Station, Sioux City, Iowa.

HELP WANTED.

Undisplayed Advertisements for
Help Wanted not exceeding fifty
words One Dollar each insertion.
Additional words two cents each.

A FIRST-CLASS MAN for Manager of sheet steel mill; only those who are thoroughly competent and can come with the highest recommendations need apply. Address "MILL," Box 713, office of *The Iron Age*, 96-102 Reade St., New York.

A GOOD TRAVELING SALESMAN, with experience and trade in hardware and cutlery. Address VOM CLEFF & Co., 105 Duane St., New York.

EXPERIENCED SALESMAN on commission, in West and South preferred, to represent first-class manufacturing concern making light kitchen utensils. "KITCHEN UTENSILS," office of *The Iron Age*, 96-102 Reade St., New York.

A THOROUGH business man to take charge of malleable iron foundry of 125 molders. Address "MALLEABLE," Box 622, office of *The Iron Age*, 96-102 Reade St., New York.

MANAGER WANTED.—A company now manufacturing one of the leading high grade bicycles in the country, desire to negotiate with a competent, experienced man to take the position of practical manager of their factory; a man possessing all the necessary qualifications will find it to his advantage to correspond with "BICYCLE," office of *The Iron Age*, 96-102 Reade St., New York. All letter will be considered confidential.

THE LATEST BOOKS.

Warm Air Furnace Estimate Book. By DANIEL P. HOLMES. Cloth..... 50c

Metal Plate Work. Its Patterns and Their Geometry, also notes on metals and rules in mensuration for the use of tin, iron and zinc plate workers, &c. By C. T. MILLIS. Second edition, revised and enlarged. 377 pages, 314 illustrations. 12mo, cloth..... \$3.50

Practical Talks on Drawing for Engineers, Machinists, Mechanics, Students of Trade Schools and Technical Colleges. By T. P. FEMBERTON. Profusely illustrated. 400 pages, 12mo, cloth.

Public Health Laboratory Work. By HENRY R. KENWOOD, M.B. Including Methods Employed in Bacteriological Research, with special reference to the Examination of Air, Water and Food, contributed by ROBERT BOYCE, M.B. Illustrated. 12mo, cloth..... \$3.00

Practical Sanitation. By G. REID. With appendix on Sanitary Law by HERBERT MANLEY. Second edition, 12mo, cloth..... \$2.40

A Practical Treatise on Foundations, explaining fully the principles involved. With descriptions of all of the most recent Structures, accompanied by numerous drawings; also an accurate record of the Bearing Resistances of Materials as determined from the loads of actual structures. By W. W. PATTON, C.E. 32 folding plates. 8vo, cloth..... \$5.00

Modern Guns and Smokeless Powder. By A. RIGG and J. GARVIE. Influence of modern explosives upon modern guns. Forces required to propel a shot. Curve of pressure. Comparison between results observed and calculated. Foreign Guns. Modern Explosives. Gun-cotton. Nitro-glycerine. Smokeless powders. Cordite. Various smokeless powders. Machinery required for manufacturing modern explosives. 83 pages, 8vo, paper..... \$2.00

Text Book of Comparative Geology. By Prof. E. KAYSER. Translated and edited by PHILIP LAKE, M.A. 506 illustrations (73 plates and 70 figures in the text), 8vo, cloth..... \$4.50

The Annual Statistical Report of the American Iron and Steel Association for 1893. 104 pages, 8vo..... \$3.00

Dynamos, Alternators and Transformers. By G. D. KAPP. Giving an exposition of the general principles underlying the construction of dynamo-electric apparatus without the use of high mathematics and complicated methods of investigation. 12mo, cloth..... \$4.00

The Science and Practice of Lighting, as applied to sheets, open spaces and interiors. By W. H. Y. WEBBER. An elementary study. A series of articles contributed to the *Journal of Gas Lighting*, etc. 8vo, cloth..... \$1.40

A Manual on Lime and Cement, their treatment and use in construction. By A. H. HEATH. 215 pages, with foldin, plate, 12mo, cloth..... \$2.50

The Heating of Large Buildings. By A. R. WOLF. Illustrated, 8vo, paper..... \$ 25

Locomotive Catechism, containing over 1300 questions and answers concerning designing and construction, repairing and running of various kinds of locomotive engines; intended as examination questions and to post and remind the engine-runner, fireman or learner. By ROE. GRIMSHAW. 360 pages, illustrated folding plates, cloth..... \$4.00

The Iron Ores of Great Britain and Ireland, Their Mode of Occurrence, Age and Origin, and the Methods of Searching for and Working Them. With a notice of some of the iron ores of Spain. By J. KENDALL. Folding plates and numerous illustrations. 12mo, cloth..... \$6.40

Pumping Engines. Duty and Capacity Tests of Worthington High Duty Pumping Engines on Water Works and Pipe Line Service. Numerous folding plates and illustrations. 8vo, cloth..... \$2.00

Water Power. Water Tower, Pumping and Power Station Designs. Prize designs. 8vo, cloth..... \$2.00

The Measurement of Electrical Currents and Other Advanced Primers of Electricity. By E. J. HOUSTON. 420 pages, 169 illustrations..... \$1.50

A New Book on Coal Mining for the Use of Colliery Managers and Others. By H. W. HUGHES. 8vo, cloth..... \$6.00

Iron and Steel. The Journal of the Iron and Steel Institute. No. 2, 1892. 584 pages, with 27 plates..... \$6.00

Mineral Industry (The). Its Statistics, Technology and Trade, in the United States and other Countries, from the Earliest Times to the End of 1892. Edited by RICHARD P. ROTHWELL. Vol. I. 1893. 8vo..... cloth \$2.50; paper, \$2.00

Municipal Improvements. A Manual of the Methods, Utility and Cost of Public Improvements, for the Municipal Officer. By W. F. GOODHUE. Illustrated; 12mo, cloth..... \$1.50

Vagaries of Sanitary Science. By F. L. DRIBBLE, M.D. The author claims that the whole sanitary movement thus far has no resemblance to scientific investigation. Much sanitary nonsense has been foisted on the people. He submits investigations on air, water, soil, sewer gas, cemeteries, public funerals, meat, milk, filth and fecal diseases, typhoid fever, yellow fever, cholera, diphtheria, epidemics, boards of health and vital statistics. His purpose is to show the true nature of diseases and the means of avoiding them scientifically. 1893. 462 pages, cloth..... \$2.00

Year Book of Science. Edited for 1892 by PROF. T. G. BONNEY, F.R.S. 12mo, cloth..... \$1.75

Telephone Lines and Their Properties. By W. J. HOPKINS. Illustrated; 12mo, cloth..... \$1.50

The Measurement of Electric Currents. By J. SWINBURNE and C. H. WORDINGHAM. Electrical Measuring Instruments. Meters for Electrical Energy. Edited by T. Commerford Martin. 237 pages, boards..... \$0.50

The Incorporated Institution of Gas Engineers. By THOS. COLE (Editor). Vol. II. Transactions, 1892. 222 pages and 30 large folding plates. 8vo, cloth..... \$3.40

History of the Manufacture of Iron in All Ages, and Particularly in the United States from Colonial Times to 1891. By JAS. M. SWANK. Second edition, revised and enlarged. 574 pages, 8vo, cloth..... \$7.50

Laboratory Calculations, and Specific Gravity Tables. By J. S. ADRIANCE. Second edition, revised and enlarged, 12mo, cloth..... \$1.25

Pumping Machinery. By WM. M. BARR. A practical handbook relating to the construction and management of steam and power pumping machines. 264 illustrations, 8vo, cloth..... \$5.00

Alternating Currents. By FREDK. BEDELL, and ALBERT C. CREHORE. An Analytical and Graphical Treatment for Students and Engineers. 112 illustrations, 8vo, cloth..... \$2.50

The Electric Railway in Theory and Practice. By O. T. CROSBY and DR. LOUIS BELL. Second edition, revised and enlarged, 183 illustrations. 8vo, cloth..... \$2.50

Tips to Inventors. By ROE. GRIMSHAW. Telling what inventions are needed, and how to perfect and develop new ideas in any lines. 84 pages, cloth..... \$1.00

SENT, POSTPAID, ON RECEIPT OF THE PRICE, BY

DAVID WILLIAMS, Publisher and Bookseller,

96-102 Reade Street, N. Y.

The Best On Earth

THAT IS WHAT THEY ALL SAY OF
BEREA GRINDSTONE

Of which we are the sole manufacturers.

Send for prices and our Catalogue C, showing Mounted Grindstones, Scythe Stones, &c.

The Cleveland Stone Co.,
CLEVELAND, O.

LAMBERSON'S

Old Reliable

HARDWARE PRICE BOOKS

Send for new Illustrated Circular.

BUELL LAMBERSON,
PORTLAND, OREGON.

KEEP BOOKS

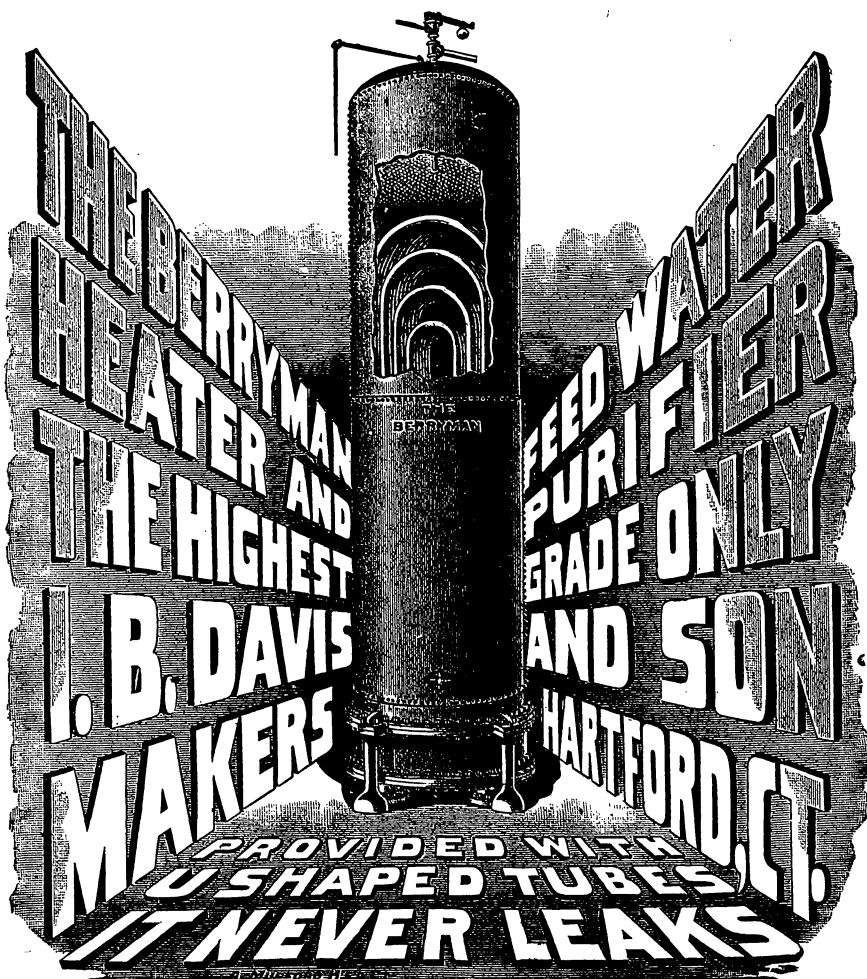
by WEST'S New Original-ENTRY LEDGER. Make the same entry but once. A Ledger in place of a full set of books. Convenient forms for all entries. Easily applied, simple, saves time. West's Self-Proving Balance locates every error. Send 3 2-cent Stamps for illustrated 16-page pamphlet.

WOLCOTT & WEST, Syracuse, N. Y.

RAILS

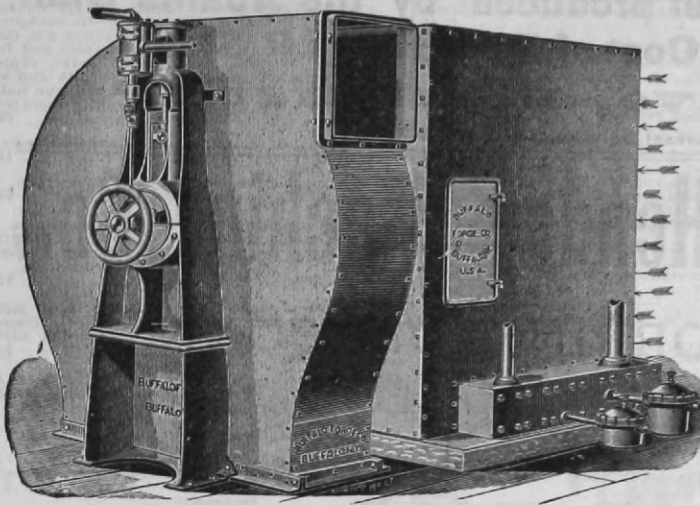
Second Hand, Suitable for Relaying. Cut to Lengths for Builders and Contractors. Old for Scrap. Dealers in all kinds of Railroad Scrap. Correspondence solicited.

SCHWARZENBERG BROS. & CO.,
187 to 189 Scranton Ave., Cleveland, O.



SEND FOR CATALOGUE A.

The Buffalo Fan System OF



Heating and Ventilating Mills, Factories and Public Buildings, Lumber, Dry Kilns, etc. Unexcelled in efficiency, durability and reliability. Blowers, Exhausters, Stationary and Portable Forges, etc. Comprehensive and complete catalogues on application.

BUFFALO FORCE CO.,
Buffalo, N. Y.

NUBIAN BONNELL'S NUBIAN BONNELL'S NUBIAN BONNELL'S NUBIAN BONNELL'S NUB

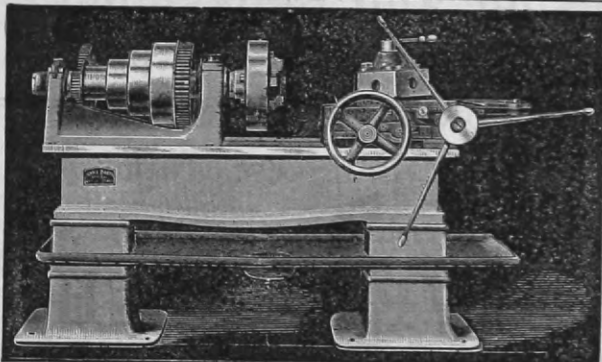
THESE SMOKE STACKS

Painted with Bonnell's "Nubian Stack Enamel," is a legend which may be seen on the Smoke Stacks at the World's Fair Power House where Nubian in competition with many was the only one to fill the bill. A hint to a man of intelligence is as good as a rapidly propelled No. 10 boot.

77 Warren St., New York, N. Y.
HALL & CARPENTER, Phila., Pa.
TAYLOR GOODRICH, San Francisco, Cal.

THE NUBIAN IRON ENAMEL CO., 33-35 Nubian Ave., CRAGIN, ILL.

NUBIAN BONNELL'S NUBIAN BONNELL'S NUBIAN BONNELL'S NUBIAN BONNELL'S NUB



**TURRET
MACHINES
LATHES,
MILLING
MACHINES,
SPECIAL
MACHINERY,**

JOHN L. BOCERT, FLUSHING, N. Y.

Milling Machines

That will actually perform the work required of them quickly, accurately, yet cheaply, and that the purchaser will not regret buying, are our specialty.

The Cincinnati Milling Machine Co.,
CINCINNATI, OHIO.

**FOR NUMBERING AND LABELING
Boxes, Drawers and Shelves**
In Hardware Stores and Factories.

[Send for sample and description of our Handy Box of small gummed Letters and Figures, intended for labeling shelf boxes. Put up especially for the Hardware trade.]

THE TABLET AND TICKET CO., Mfrs.,
87-89 Franklin St. Chicago. 99 Franklin St., New York.

**WILLSON'S
PAPER
LETTERS**

**IF YOU WANT
A NIAGARA DYNAMO OR MOTOR**
or if you are a dealer and want an Agency send for our Catalogue and Price-List.
LOVELL MFG. CO., LTD., ERIE, PA.

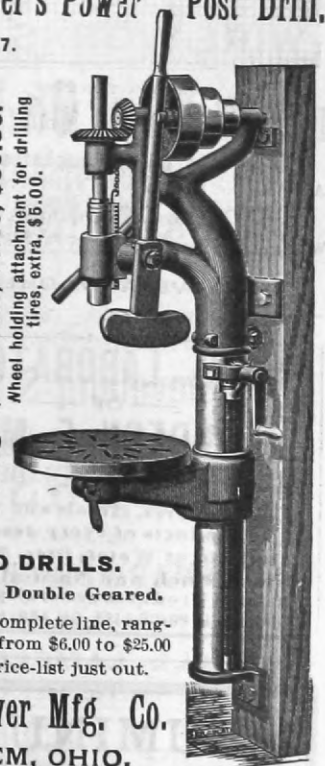
**Saves
Rewriting
Names.**

**The Scattergood
Time Record and
Pay Roll Book**
(Pat. Oct. 13, 1891.)
Address for Circular to
HENRY W. SCATTERGOOD,
23 Richmond St., Phila., Pa.
F

Silver's Power Post Drill.

FIG. 727.

Has OUT GEARS, and is a thoroughly first-class tool in all respects. Dia. Column, 4 1/2 in.; Dia. Spindle, 1 3/16 in.; and bored No. 2 Morse Taper; Vertical Travel, 6 in.; Drills to centre 18 in. circle.
Weight, 325 lbs.; Price, \$60.00.
Wheel holding attachment for drilling tires, extra, \$5.00.



HAND DRILLS.

Single and Double Geared.
Large and complete line, ranging in price from \$6.00 to \$25.00 list. New price-list just out.

The Silver Mfg. Co.
SALEM, OHIO.

THE PEERLESS

STEEL

Flue Cleaner.

From 1 1/2 to 16 in.

For descriptive circular and prices, address

the Manufacturer
Jas. T. Mackay,
St. Louis, Mo



6 Inches and Over.



Under 6 Inches.

THE STEEL AND IRON IMPROVEMENT CO.,

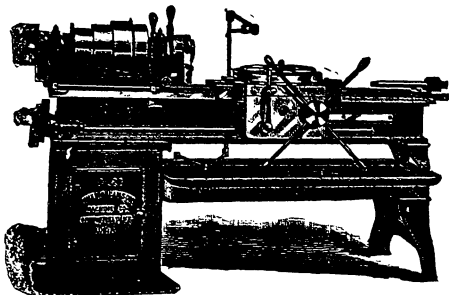
Controlling the Adams-Blair Process and other Steel and Iron Patents.

High Grade Open Hearth Steel produced by the Adams-Blair Process at less than the Cost of BESSEMER Steel.

91 and 98 Fifth Ave., Pittsburgh, Pa.

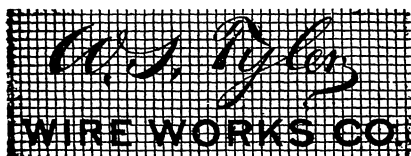
EASTERN OFFICE: 412 Drexel Building, Philadelphia, Pa.

2 BY 24 FLAT TURRET LATHE.



SEND FOR CATALOGUE FOR '92.

Jones & Lamson Machine Co.,
SPRINGFIELD, VERMONT, U. S. A.



MANUFACTURERS OF

Improved Revolving Mining Screens,

For Coal, Ores, Phosphates, Etc.

Also: Tipple Screens and Yard Screens. Extra Heavy Double Crimped Mining Cloths, of every description.

W. S. TYLER, Pres. PR C'OR PATTERSON, Sec and Treas.
CLEVELAND, OHIO.

ANALYTICAL AND ASSAY LABORATORIES

OF
DR. GIDEON E. MOORE,
221 PEARL ST., (Corner Platt St.) NEW YORK.

Assays of Ores, Metals and Metallurgical Products of every description. Analysis of Water, Ores, Minerals, Metals, Fuel, and Natural and Industrial Products generally.

PRINTED PRICE-LIST ON APPLICATION.

ALUMINUM.

The Pittsburgh Reduction Co.,

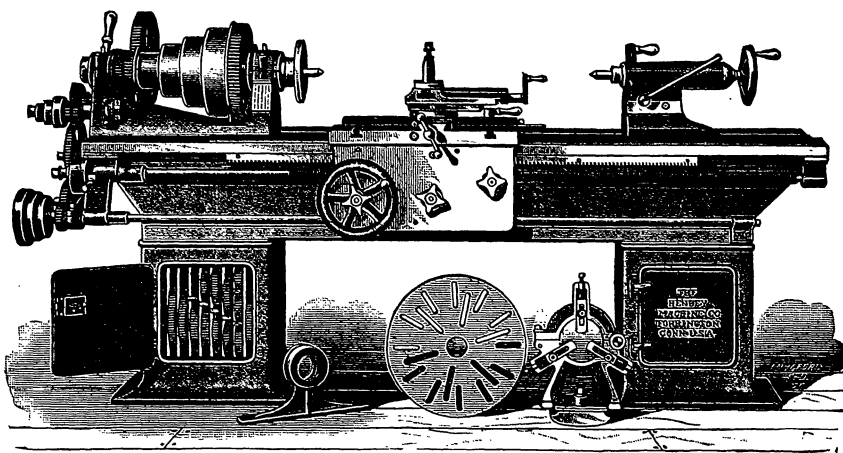
116 Water St., Pittsburgh, Pa.,

Offer Aluminum guaranteed equal in purity to the best in the market, at lowest rates obtainable.

ALUMINUM SHEET, WIRE,
AND CASTINGS.

The Hendey Machine Co.,

TORRINGTON, CONN.



18 in. x 8 ft Engine Lathe, of heavy pattern. Hollow Spindle, Power Cross Feed, Compound or Raise and Fall Rest, Taper Attachment, &c.

A TIME SAVER IN THE MACHINE SHOP.

For Particulars Apply to the
NEWARK MACHINE TOOL WORKS,
Newark, N. J.

It will

be to your

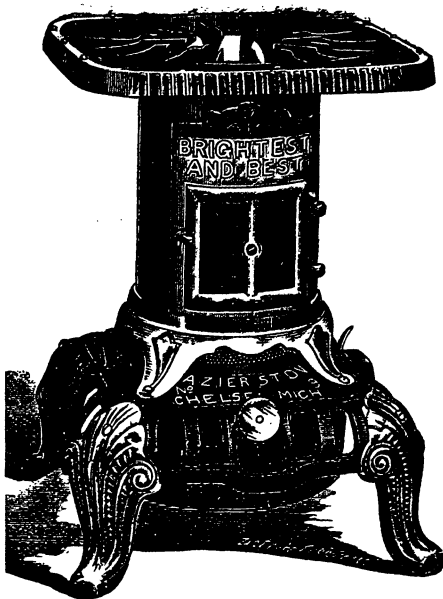
CREDIT

to handle
the

Stearns
Lawn Mower.

E. C. Stearns & Co.,

Syracuse, N. Y.



No. 8 B. & B. OIL COOK STOVE.

STOP!

Don't turn another page till we give you a tip in regard to the

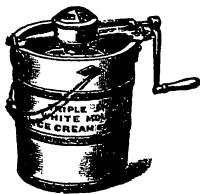
LATEST AND BEST Oil Cook Stove

ON THE MARKET.

WILL YOU DO US A FAVOR?
Then compare our goods and prices with everything that is offered to the trade, then send in your orders.

The Glazier Stove Co., Mfrs., CHELSEA, MICH.

W. W. MONTAGUE & CO., San Francisco, Cal., Agents for the Pacific Coast.



WHITE MOUNTAIN ICE CREAM FREEZER.

It always has been, and is still, the best. Try them.

—MANUFACTURED BY—

THE WHITE MOUNTAIN FREEZER CO., - - Nashua, N. H.

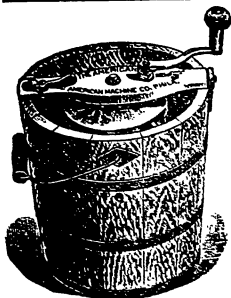


THE OLD RELIABLE STANDARD FREEZER

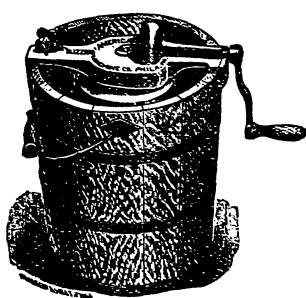
has the reputation of being the BEST ICE CREAM FREEZER ever introduced. STRENGTH, DURABILITY, NEATNESS AND EFFICIENCY are prominent points in the manufacture. Full Size Can, CEDAR TUB, Detachable Hinged Crossbar, Self-adjusting Vibratory Scraper, etc.

Write for Illustrated Circular, Price-List and Discounts of STANDARD, EXPERT, MODEL and MACHINE Freezers.

CHAS. W. PACKER, Mfr.,
20 North Fourth Street, - Philadelphia.



American.



Blizzard.

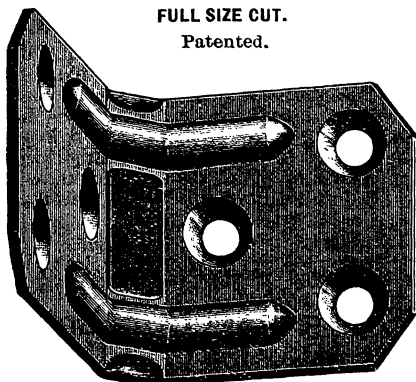


Gem.

ICE CREAM FREEZERS.

Pre-Eminently DESIGN, CONSTRUCTION, MATERIAL, WORKMANSHIP, USE.

FOR CATALOGUES AND PRICES WRITE
NORTH BROS. MFG. CO.,
American St. and Lehigh Ave., Philadelphia, Pa. U. S. A.



FULL SIZE CUT.
Patented.

CORRUGATED STEEL CORNER BRACES.

A SUPERIOR ARTICLE.

Plain, Japanned or Bronzed.

—SAMPLES AND PRICES ON APPLICATION.—

THE STANLEY WORKS,

New Britain, Conn.

79 Chambers St., N. Y.



We are
always anxious to
secure live, responsible
agents.



Surely you like Pleasant Hours.

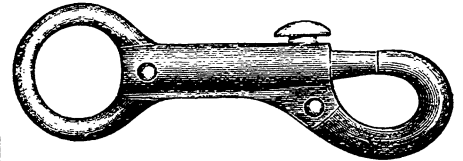
Then Ride a Sylph.

It is pleasant to lead; to know your work is easy; to feel that rough roads produce no pain; to know you are in advance of the masses; to know you have the finest riding cycle ever built. Sylph Cycles Run Easy. Try One.

Catalogue free. Agents wanted.

ROUSE-DURYEA CYCLE CO., 146 G St., Peoria, Ill

THE BANNER BOLT SNAP.



This snap has many important advantages over other makes of Bolt Snaps, viz. It is lighter, the spring is entirely covered and protected from foreign substance and freezing, and is lower in price.

Made in all sizes; Round, Limp and Open Eye. We are headquarters and the most extensive manufacturers in Saddlery, Coach and General Hardware Specialties.

Covert's Saddlery Works,

FARMER, N. Y., U. S. A.

"The ease of cycling is in the tire."

Columbia Bicycles are fitted with the

COLUMBIA

PNEUMATIC

TIRE

The Columbia catalogue is the most readable book of its class — beautifully illustrated — Free at Columbia agencies — by mail for two 2-cent stamps.

Guaranteed against puncture. Fastest and most resilient. Built to last.

POPE MFG. CO.,

Boston. New York. Chicago. Hartford.

CLARK'S BEST QUALITY SCREW DRIVERS.



Four Drivers and one Handle; all interchangeable; are hardened and tempered all over; made of best stock, and finished first class.

FOR SALE BY ALL HARDWARE DEALERS.

MANUFACTURED BY

R. H. BROWN & CO.

NEW HAVEN, CONN.

*You take no risk on the quality.
We make only the best!*



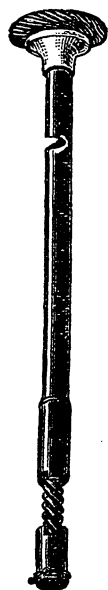
**Sand
Papers**
IN
Reams and Roll

Flint Paper
Garnet Paper
Emery Paper
Emery Cloth

AIR FELTING for covering Boilers, Steam and Water Pipe, and lining Refrigerators.

BAEDER, ADAMSON & CO.

730 MARKET STREET, PHILADELPHIA;
97 BECKMAN STREET, NEW YORK.
143 MILK STREET, BOSTON;
182 LAKE STREET, CHICAGO.



STANDARD Spiral Screw Drivers.

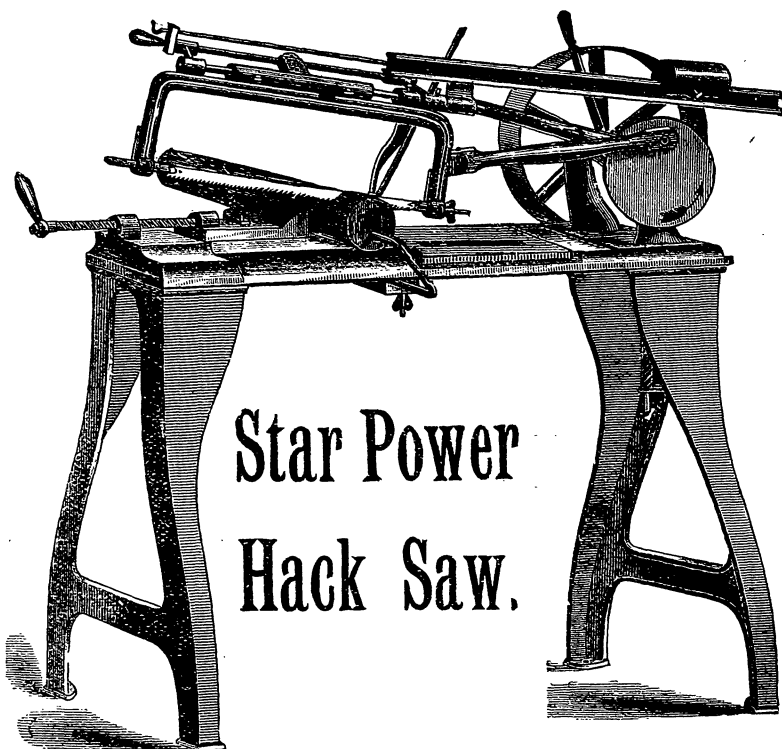
Patented July 3, 1888.

STRONGEST and QUICKEST SCREW DRIVER in the market. One Tempered Steel Bit furnished with each Driver FINELY POLISHED and HEAVILY NICKEL PLATED. Lignum Vitæ Head. LENGTH OVER ALL, 18 inches. Each one in a separate wooden box with slide cover.

Chantrell Tool Company,
Reading, Pa.

JOHN H. GRAHAM & CO.,
General Agents,

113 Chambers St., New York.



Star Power Hack Saw.

The use of Hack Saws for cutting metals has increased a thousand fold, at least, in the last ten years, or since the Star Blades were first introduced. Before that time England furnished most that were used. Now the world's supply is made in this country. We handle nearly all that are made and know that the demand doubles every 2 months.

About two years ago we began making a Power Frame for these Star blades, which has proved to be a very great success. The speed and pressure is regulated that one blade will cut all day long, or, say, ten times as much as when used in a hand frame. It will cut all metals up to $\frac{3}{4}$ inches, round or square, requiring no attention after the work is put in the vise. We can give the names of several thousand Iron Workers who are using these Power Saws, and we think they will all say that the machines are worth to them a great deal more than they cost. It is only a question of a very short time when all iron working shops will have from one to a dozen of these saws in use. Price, \$25.

We are the only Headquarters for Star Hack, Butcher and Bracket Saws.

MILLERS FALLS CO., 93 Reade St., NEW YORK.

THE COST OF MANUFACTURES —) AND THE (— ADMINISTRATION OF WORKSHOPS, Public and Private.

BY CAPT. HENRY METCALFE.

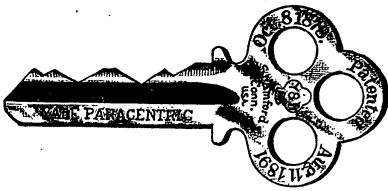
322 Pages; 6 $\frac{1}{4}$ x 9 $\frac{1}{2}$ inches.

CLOTH, \$5.00

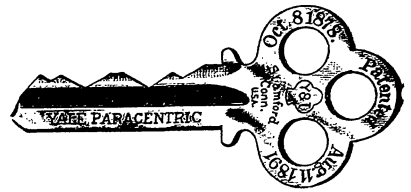
This work is an effort to correct some of the wrong, and consequently unprofitable, methods of conducting manufacturing establishments, and proposes plans for more correct ones. A system of mechanical bookkeeping, based on the card catalogue method, dispensing with the use of books, by which the cost of manufactures may be promptly determined, either in gross or detail, as to component parts and operations thereon. Comprising a simple method of recording all dealings with material which relate to its procurement, expenditure or possession. Applied, with numerous practical illustrations, to the trust, accountability for public property and funds required of the U. S. Ordnance Department, with a review of its present practice. Illustrated with tables, forms of cards, etc.

Any Book Published Sent, Post-paid, on Receipt of the Price, by

DAVID WILLIAMS, Publisher and Bookseller
96-102 Reade Street, New York.



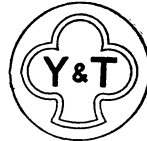
YALE



PARACENTRIC



LOCKS.



THE YALE & TOWNE M'F'G CO.,

STAMFORD, CONNECTICUT.

New York. Chicago. Philadelphia. Boston. Pittsburgh. San Francisco.

Don't make MistakesUSE LADD'S
DISCOUNT BOOK

ACCURATE, RAPID, PRACTICAL.

IT WILL SAVE YOU
TIME, MONEY and PATIENCE.

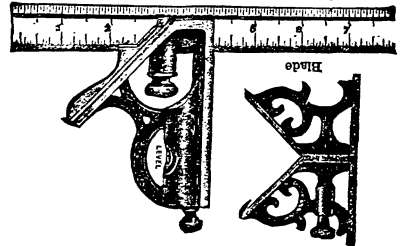
Regular, \$3.00.

Double Indexed, \$4.00.

Sent, Postpaid, upon Receipt of Price.

DAVID WILLIAMS, PUBLISHER AND BOOKSELLER,
96-102 Reade Street, New York.

CHAPLIN TRY AND CENTRE SQUARE.



Also a full line of

MACHINISTS' FINE TOOLS.

If you haven't our 1893 catalog send us a postal card.

STANDARD TOOL CO.,

ATHOL, MASS., U. S. A.

ATHOL MACHINE CO., Selling Agents.

IT PAYS. Nothing about a Hard ware Store looks so well as clean shelves and the goods neatly boxed with a fresh sample on the front. Customers are attracted by such a display of care, and notice and buy things that would ordinarily go without notice. The Boxes are inexpensive, save the goods, make a big show for a small investment and help the salesmen. Send to

JESSE JONES & CO., Philadelphia
for Catalogue of prices, styles and references.

IF YOU WANT THE BEST
FOR CATALOGUE & PRICES
THEIR MAKE IS EQUAL
IF NOT SUPERIOR
TO ANY OTHER.
HADDAM, CONN.
HAVE BEEN IN BUSINESS SINCE 1840.

IF YOU WANT THE BEST
FOR CATALOGUE & PRICES
THEIR MAKE IS EQUAL
IF NOT SUPERIOR
TO ANY OTHER.
HADDAM, CONN.
HAVE BEEN IN BUSINESS SINCE 1840.

IF YOU WANT THE BEST
FOR CATALOGUE & PRICES
THEIR MAKE IS EQUAL
IF NOT SUPERIOR
TO ANY OTHER.
HADDAM, CONN.
HAVE BEEN IN BUSINESS SINCE 1840.

W. & B. DOUGLAS, MIDDLETOWN, CONN.

Branch Warehouses: 85 and 87 John St., New York; 197 Lake Street, Chicago, Ill.

THE OLDEST AND MOST EXTENSIVE MANUFACTURERS OF

Pumps, Hydraulic Rams, Garden Engines,

Yard Hydrants, Street Washers, Galvanized Pump Chain, Wind Mill Pumps and other Hydraulic Machines in the World.

DOUGLAS' DIAPHRAGM PUMPS, "Loud Patent."

A LARGE CAPACITY, AND EASY WORKING PUMP FOR

Water Works, Sewer Contractors, Foundation Builders, Mines, Quarries,

Fig. 120.

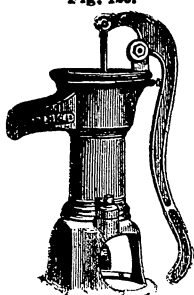
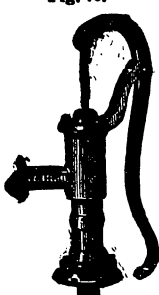


Fig. 70.



or wherever it is desired to raise a large quantity of water by hand power.

The pump has large valves (accessible by hand) and will pump water containing sand, gravel, sewage matter, &c., without choking or any perceptible wear.

Capacity from 3,000 to 4,500 gallons per hour.

These pumps are simple, durable and low priced. Made either as shown in cut for Hose or for IRON Pipe Suction underneath.

Send for Circular and Price List.

Fig. 202.



Fig. 381.



THE DEMING CO.
FACTORY SALEM O.U.S.A.
MANUFACTURERS OF
HAND & POWER PUMPS, WELL SUPPLIES & C. VERTICAL STEAM PUMPING ENGINES.
N.Y. OFFICE: 72 JOHN ST.
HENTON & HUBBELL
GEN'L. WESTERN AGTS.
55 & 57 N. CLINTON ST.
CHICAGO, ILL.

F.E. MYERS & BRO.

ASHLAND O.
+ CATALOGUES FREE +
Ashland Pump and Hay Tool Works.

THE KOCH PAT.
SHIFTABLE REVERSIBLE.
FOR SHELVING STORES, LIBRARIES, CUPBOARDS, &c.
BRACKETS. MANUFACTURED BY
KOCH A. B. CO.
518 MAIN ST. PEORIA, ILL.

THE DEALER who sells what
THE PEOPLE ask for

MAKES FRIENDS and MONEY, and
SAVES TIME and TROUBLE.

The people ask for

LePage's Liquid Glue,

And the people are right.

It is the strongest and best glue made. It has been imitated, but never equalled. Be sure to get what you order and ACCEPT NO SUBSTITUTES.

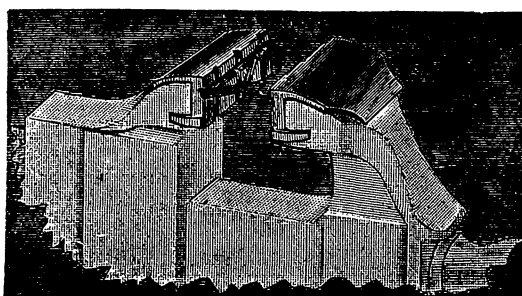
Our name is on every label

RUSSIA CEMENT CO.,

GLOUCESTER, MASS.

New York Office, 95 Reade and 113 Chambers Streets.

Pacific Coast Office, 23 Davis Street, San Francisco, Cal.



BINGHAM PATENT VISE JAW CAP

Will Fit any Kind of Vise.

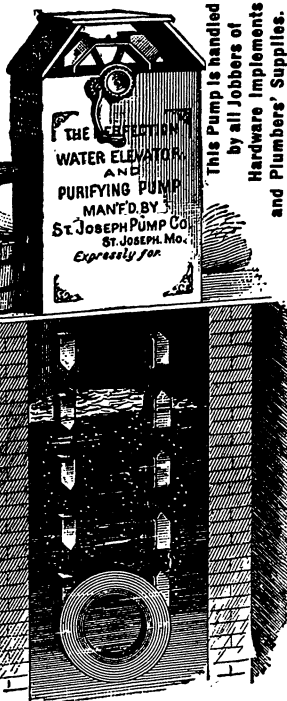
For protecting finished work. Will hold finished rods of any shape without injury.

3 1/2 inch, per pair, 40 cents.
4 1/2 " " 50 "
4 3/4 " " 60 "

PRENTISS VISE CO.

44 Barclay St., New York.

OUR NEW DOUBLE
GEARED FIXTURE
FOR 1892.
GUARANTEED.



IF
YOU
SELL
ONE OF
OUR PUMPS
TO A CUSTOMER
IT WILL PROVE
A WEDGE FOR IN-
CREASED SALES IN
OTHER LINES - - -

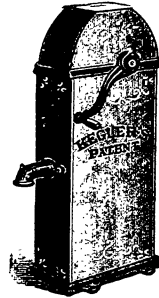
ST. JOSEPH PUMP CO.,
ST. JOSEPH, MO., U. S. A.
E. A. KING, Sec'y and Gen'l Manager.

IRON INSTEAD OF WOOD.

**GALVANIZED IRON
TUBING and CURB,**

— FOR —
CHAIN PUMPS,
(Kegler's Patent)

Are Giving Universal Satisfaction,
BECAUSE:

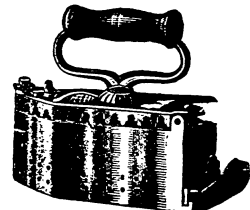


They do not rust and accumulate filth—always clean. Extreme lightness is combined with strength and durability. No freezing, no waste of water by reason of enlarged reservoir at top of tubing. No annoying wheel at bottom. Easy to handle. Tubing weighs less than 1/4 lb. per ft., is connected by couplings and can be attached to any make of curb.

Send for Catalogue.

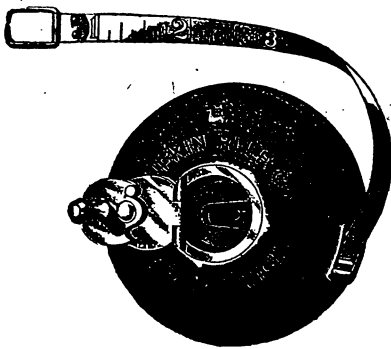
Bellevue Pump Co., Bellevue, Iowa.

**THE
UNIVERSAL SAD IRON CO.**
MILWAUKEE, WIS.,



Manufacturers of the Best Charcoal "Sad Iron" in the world for Families, Dress and Cloak Makers and Tailors. Send for Circulars and Sample Irons. Agents wanted everywhere

"RELIABLE" Steel Measuring Tapes.

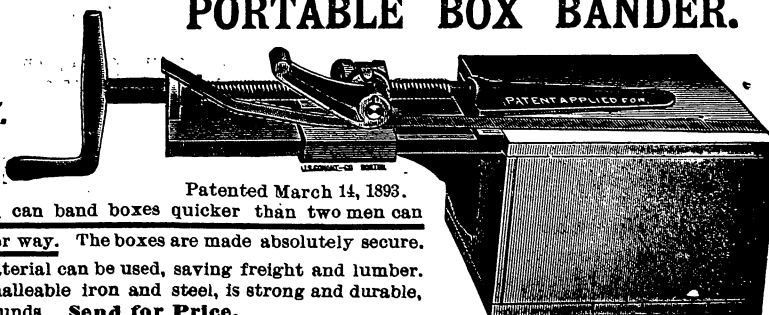


Entirely new. Handle or crank when closed is perfectly flush with leather case. Opens by pressing button on opposite side and folds out double, giving increased leverage. Best and most convenient steel tape on the market. Fully guaranteed. Will send samples on approval. We carry a complete stock of our goods at our New York Office, 20 Murray St.

LUFKIN RULE CO., Saginaw, Mich.

**SOON
PAYS
FOR
ITSELF.**

PORTABLE BOX BANDER.



Patented March 14, 1893.

One man can band boxes quicker than two men can in any other way. The boxes are made absolutely secure. Lighter material can be used, saving freight and lumber. Made of malleable iron and steel, is strong and durable, weighs 8 pounds. **Send for Price.**

J. W. GOODELL, Manufacturer,

BURLINGTON, VT.

Lightning Band for Cases and Crates.

(COVERED BY U. S. LETTERS PATENT.)

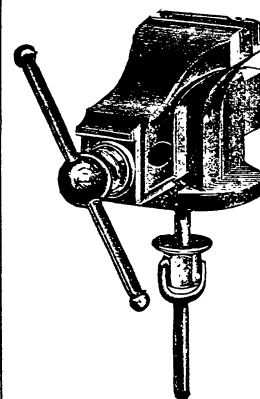


Mounted on reels and always ready for use and convenient to handle. Easily and quickly binds shipping cases and crates in a neat, strong and substantial manner.

PRICES:

No. 1, per reel of 2000 ft., \$4.50 net.
No. 2, per reel of 2000 ft., \$4.75 net.
Pliers for cutting wire, 50 cents extra.
No. 1 for cases under 300 or 400 pounds, and No. 2 for all heavier cases.

Buffalo Specialty Mfg. Co.
Sole Manufacturers,
Buffalo N. Y. U. S. A.

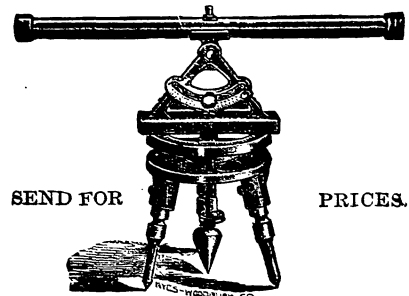


**HOLLANDS'
OFFSET JAW
VISE.**

Specially adapted for drill press work where chucks cannot be used and equally good for special or regular bench work.

**Hollands Mfg. Co.,
ERIE, PA.,**
Manufacturers all styles VISES.

ARCHITECTS' & CARPENTERS' TRANSIT,



SEND FOR

PRICES.

C. F. RICHARDSON & SON, Athol, Mass.

Manufacturers of Iron Levels

and Leveling Instruments.



**N. Y. MALLET AND HANDLE
WORKS,**

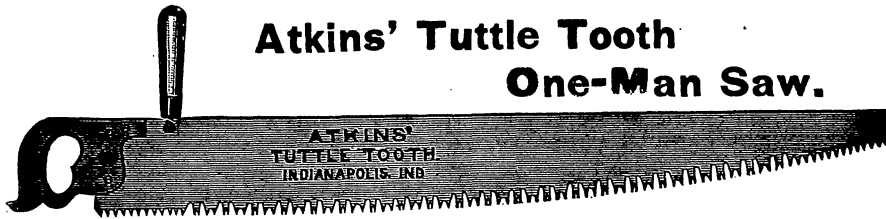
MANUFACTURERS OF
M ALLETS.
Also Cotton and Bale
Hooks.

Patented Feb. 13, 1877, a new
combination of Hooks.
**456 E. HOUSTON ST.,
New York City.**

E. C. ATKINS & CO., Indianapolis, Indiana.

We make a Specialty of Fine High-Grade Saws.

Atkins' Tuttle Tooth One-Man Saw.



BRANCH HOUSES:

Memphis, Tenn.
Chattanooga, Tenn.
Minneapolis, Minn.

ATKINS' TUTTLE TOOTH.

The Original Tuttle Tooth—the Best Saw in the World for the Money.



GEO. N. CLEMSON, Pres.

LOUIS DUHME, Vice-Pres.

ROBERT J. JOHNSON, Treas.

F. B. EARLE, Sec.

The National Saw Co.,

OPERATING

Wheeler, Madden & Clemson Mfg. Co., Middletown, N. Y. Woodrough & McParlin, Cincinnati, O. Woodrough & Clemson, Boston, Mass. Monhagen Steel Works, Middletown, N. Y. Richardson Brothers, Newark, N. J. Harvey W. Peace Co., Brooklyn, N. Y. Pennsylvania Saw Co., Philadelphia, Pa.

GENERAL OFFICE

96 & 98 READE ST.,

NEW YORK.

SAWS

Three Essentials

IN THE MODERN CROSS-CUT SAW.

- 1.—Teeth of uniform thickness.
- 2.—Five Gauges taper in middle of blade.
- 3.—Three Gauges heavier on ends than in center of back.

For 10 YEARS the Simonds Crescent-ground Cross-cut Saw (the only Saw on the market possessing these **ESSENTIALS**) has stood out prominently in contrast with all other makes of cross-cut saws. It has been the **CRESCENT-GROUND** against the **FIELD--MODERN IDEAS** against **ANCIENT METHODS**.

TO-DAY the Crescent-ground Saw is in use in every important lumber camp in the United States; Manufacturers have endeavored to imitate it, but the Machinery producing the Saw, the Process by which it is produced, and **THE SAW**, are patented. All imitations are but involuntary acknowledgments of the **SUPERIORITY** of

THE CRESCENT-GROUND CROSS-CUT SAW.

(PATENTED DEC. 26, 1882.)

SIMONDS MFG. CO.,

FITCHBURG, MASS.

CHICAGO, ILL.

SIMONDS SAW CO.,

SAN FRANCISCO, CAL.

PORTLAND, ORE.

CIRCULAR,
BUTCHER,

BAND,
BUCK

SAWS

MANUFACTURED BY

C. A. HILES & CO.,

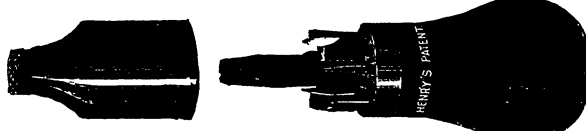
336-338 Carroll Ave., CHICAGO.

The New York Safety Dumb Waiter,
"The Manhattan Dumb Waiter,"
"The Improved Humphrey Hand Elevator,"
Made specially to be sold by Hardware Stores. Thousands in use. Catalogues on application.
THE STORM MANUFACTURING CO.
NEWARK, NEW JERSEY.
Formerly of Poughkeepsie, New York.

HORACE E. BRITTON, Stoughton, Mass.,

Manufacturer of the

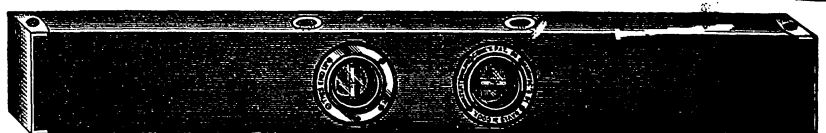
HENRY'S PATENT COMBINATION
HAFT,



AND OTHER TOOL SPECIALTIES.

The Combination Haft contains six Brad-Awls, one Chisel, Screw Driver, Diamond Point Awl, Marking Awl, Tack Puller and Reamer. Send for Circular and Prices.

Full Set Sent Post-paid on receipt of \$1.00. (No stamps.)



COOK'S PATENT LEVEL.

Made in Wood and Iron. Every Level Fully Guaranteed.

Inquire at your nearest hardware store for them. If not in stock, send to

TAKE NO
OTHER.

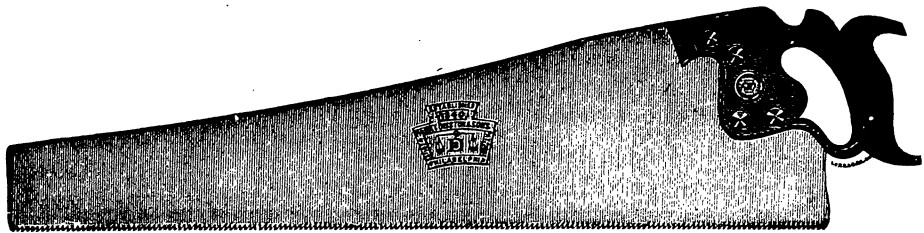
DAVIS & COOK,
WATERTOWN, N. Y.

"If you want a Saw it is best to get one with a name on it which has a reputation.
A man who has made a reputation for his goods knows its value as well as its cost and will maintain it."—HENRY DISSTON.

THE SAWS THAT LEAD THEM ALL

DISSTON & SONS' PATENT D-8 HAND SAW.

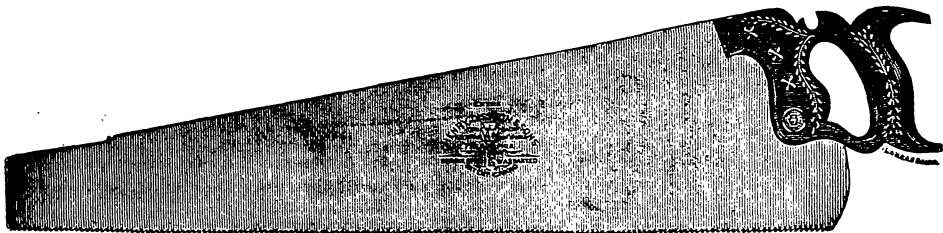
"THE
SAW,"
HOW
TO
CHOOSE
IT,
AND
HOW
TO
KEEP
IN
ORDER,
Sent
Free
on
Receipt
of
Name
and
Post Office
Address.



This Saw combines all the valuable improvements in Hand Saws that have been made by us of late. The first and most important is the hollow or skew back, the success of which can best be attested by the number sold. The peculiar shape of the butt or heel, coupled with the new method of fastening to the handle, give a full stroke of the blade without fear of catching or hooking in the work ; and as the handle is put further on the blade you have a full stop on the proper point and a greater command over your Saw, by reason of being two inches nearer the point, which must give more power.

The Saw being let into the handle on a circle, has a perfect bearing, which, with the new screws, makes it stronger and almost impossible to work loose, and avoids the unsightly gap that is seen on the back of the old style handle. All the above features are patented.

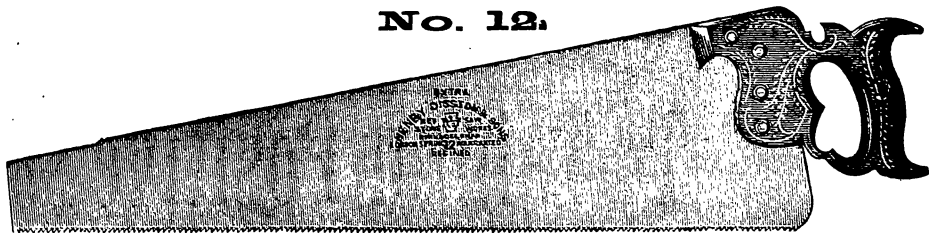
Our New No. 16 Premium Saw.



AN EXTRA FINE SAW IN EVERY RESPECT.

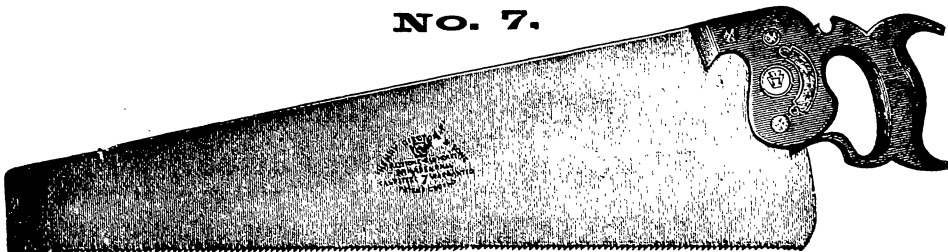
Having the Latest Close up Handle, Spring Steel Blade, Extra Thin Back, Finely Grained, with an Apple Handle and Four Brass Centennial Screws.

No. 12.



DISSTON & SONS' Extra Refined London Spring Steel, Selected and highly Polished Blade, Handle Carved and Polished, 4 Improved Brass Screws, the finest Hand Saw manufactured.

No. 7.



DISSTON & SONS' Cast-Steel, Warranted, Beech Handle, Polished Edge, 4 Improved Screws, Grained Blade.

"POCKET
EDITION
OF
THE
SAWYER"
and
"LUMBER-
MAN'S
HAND
BOOK,"
Sent
Free
on
Receipt
of
Name
and
Post Office
Address.

ASK YOUR DEALER TO ORDER THEM FOR YOU.

HENRY DISSTON & SONS

(INCORPORATED),

Keystone Saw. Tool, Steel and File Works, Philadelphia, Pa.

FACTORIES AT
AKRON, - OHIO.
CANTON, - OHIO.

The Whitman & Barnes Mfg. Co.

— MANUFACTURERS OF —

FACTORIES AT
SYRACUSE, - N. Y.
ST. CATHARINES, ONT.

Spring Keys. **Spring Cutters.** **Flat Spring Keys.** **Flat Riveted Keys.**

BRANCHES AT
79, 85 W. Monroe Street,
CHICAGO ILL.
1324 West 11th Street,
KANSAS CITY, MO.
126 Main Street,
CINCINNATI OHIO.

BRANCHES AT
32 So. Market Street,
BOSTON, MASS.
1917 Market Street,
PHILADELPHIA, PA.
33 Market Street,
SAN FRANCISCO, CAL.

NEW YORK OFFICE, 102 CHAMBERS ST.

NICHOLSON FILE CO.

PROVIDENCE, R. I.

THE LARGEST AND MOST COMPLETE FILE WORKS IN THE WORLD.

3000 VARIETIES FILES [X.F.] AND INCREMENT CUT FILES

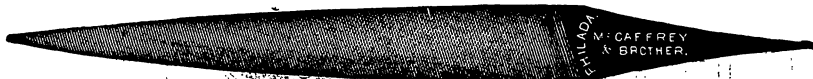
Philadelphia, 1876.

McCAFFREY FILE CO.,

FIFTH and BERKS STS.,


PHILADELPHIA, PA.

For Superiority



Manufacture and keep in stock a full line of FILES and RASPS only, for which we claim special advantages over the ordinary goods, and ask domestic and foreign buyers to allow us to compete for their trade.

Superiority acknowledged wherever used, sold or exhibited.

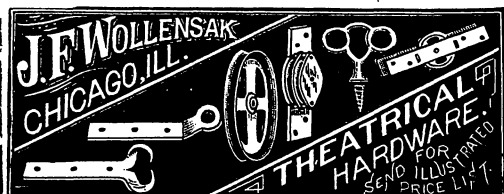
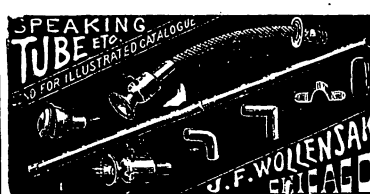
BEST	"TROJAN" HORSE RASPS.	LOWEST
CRUCIBLE		IN
STEEL.		PRICE.
		LET
STRONGEST	BANKER & WHITE,	TROY, N. Y.
TOOTH.	(Troy File Works.)	US
		QUOTE.

The Taintor Positive Saw Set.

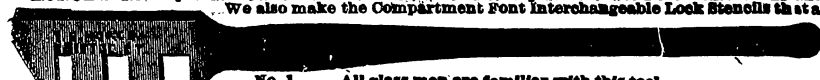
Mechanics are now inquiring for this tool, and Hardware Dealers should have them in stock, or at least have a sample.

For Prices and Discounts, address

WIEBUSCH & HILGER, LTD., SOLE AGENTS,
84 and 86 Chambers Street, **NEW YORK.**



MONCE'S Novelty Glass Cutters are the standard. No. 17 just out. Send for Illustrations and Price. We also make the Compartment Font Interchangeable Lock Stencils that are having such run.



No. 1.
S. G. MONCE

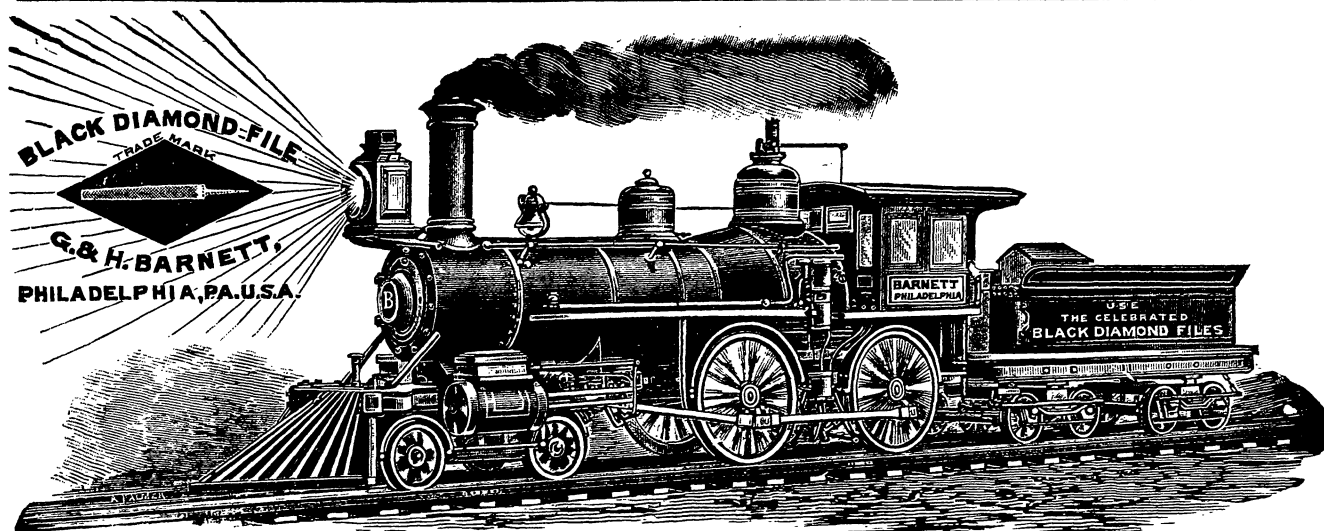
All glass men are familiar with this tool.

BRISTOL, CONN.



WM. KROGSrud,
Engraver and Die Sinker,
61 Fulton St., N. Y.,
Manufacturer of
STEEL STAMPS
For Every Purpose.
Steel Letters & Figures.
Burning Brands, Stencils
&c. Send for Illustrated
Catalogue.





J. M. KING & CO.,
WATERFORD, N. Y.

Manufacturers of
BUTTON'S

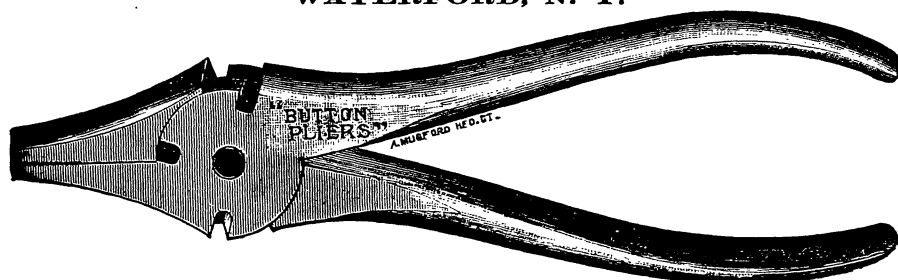
**Pat. Wire Cutter
AND PLIER COMBINED.**

Specially Adapted for Use on Wire Fence.

Also Manufacturers of BLACKSMITHS' and
MACHINISTS' STOCKS and DIES, PLUG and
TAPER TAPS, HAND, NUT and SCREW
TAPS, PIPE TAPS and REAMERS.

Price-List on Application.

Established by DANIEL B. KING, 1829.



THE H M MYERS COMPANY
ONE SOLID STEEL SHOVELS
THE BLADE  **AND STRAPS**
Are made from this one solid Piece of Steel. *A Perfect Plain Back Tool With thick Centre.*
WITHOUT WELD OR RIVET
CAREFULLY TEMPERED
WRITE FOR LISTS **BEAVER FALLS, PA. AND DISCOUNTS**

SICKELS, SWEET & LYON,

Wholesale Hardware.

Office, 35 Barclay St. Warehouse, 40 Park Place, New York.

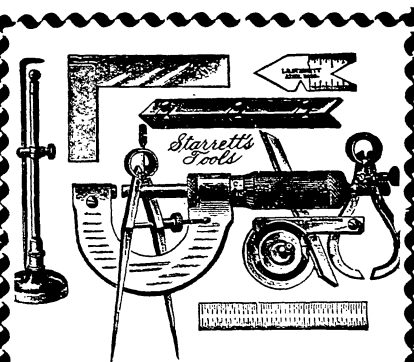
SELLING AGENTS FOR

"Perfection" and "New Easy" Lawn Mowers,
Cortland Door and Window Screens,
"Eagle" Files,
Union Steel Screws.
Full line Steel and Wood Farming Tools. Shipments from Factories or Store.
Spring Catalogue No. 5 Issued in February.

SICKELS, PRESTON & NUTTING CO.,
Wholesale Hardware and Tinnery's Stock.

N. Y. Office as above.

DAVENPORT, IOWA.



**Skilled
Mechanics**

want tools that are warranted
accurate, best in workmanship,
latest in design, finest in finish.

**Live
Dealers**

want tools they can swear by,
not at. That can be relied upon
to satisfy intelligent customers.
That come nicely put up. That
pay a good profit.

**Starrett's
Tools**

meet the requirements of both.

SEND FOR CATALOGUE.

L. S. STARRETT

Athol, Mass., U. S. A.

LONDON AGTS: Chas. Churchill & Co., Ltd.,
21 Cross St., Finsbury, E. C.

TRADE MARK



John Wilson's Butchers' Knives and Steels, Skinning, Sticking, Farriers' & Shoe Knives,

Have established and maintained their reputation, for superiority,
against all Competitors, from

THE YEAR SEVENTEEN HUNDRED & FIFTY,
and are still in increasing demand. As in the past, it is the unalterable
DETERMINATION OF THE HOUSE TO SEND OUT NOTHING BUT WHAT IS OF THE HIGHEST POSSIBLE QUALITY.

WORKS: SYCAMORE STREET, SHEFFIELD, ENGLAND.

SOLE AGENTS FOR THE UNITED STATES, AND THE CANADAS.

Messrs. Hermann Boker & Co., 101 and 103 Duane St., New York.

CORPORATE MARK



JOSEPH RODGERS & SONS, Limited.

—MANUFACTURERS OF—

Pocket and Table Cutlery, Scissors, Razors, Erasers, &c., &c.

These goods have fully maintained their reputation as the best cutlery in the world for over

ONE HUNDRED AND FIFTY YEARS.

Any Infringements of our Name and Corporate Mark will be promptly prosecuted.

Sole Agents for the United States,

ALFRED FIELD & CO., 93 Chambers and 75 Reade Street, New York.

Established 1836.

ALFRED FIELD & CO.,

93 Chambers and 75 Reade Streets,

NEW YORK.

IMPORTERS OF

**HARDWARE, CUTLERY, GUNS ANVILS,
CHAINS, FILES.**

SOLE AGENTS FOR

Joseph Rodgers & Sons, Best Cutlery in the
world; W. K. & C. Peace, unrivaled Grass Hooks
Straw Knives and Scythes; Joseph Elliot & Sons,
Celebrated Razors; Peugeot Frères, "French
Toilet" and other Clippers; L. Hugoniot Tissot,
Fine Steel Pliers, &c.; Eley Bros., Caps, Wads,
Cartridge Cases, &c.; Webster & Horsfall, Steel
Wire of every description.

Send for Rodgers' New Illustrated Catalogue

We manufacture all kinds of

EDGE TOOLS

of highest grade and sell at proper prices
Send for Illustrated Price-List.

Buffalo Edge Tool Works.

308, 310 and 312 William Street,
BUFFALO, N. Y.

CHAS. DAVIES & CO.,

MANUFACTURERS OF

LADDERS,

Extension and Single. Fire, Railroad and
Painters' Ladders.

LAWN SWINGS,

Window Jacks and Swing Scaffolds. Trade dis-
count 20 and 5% list. We pay the freight.
Catalogue Furnished.

229 to 335 West 3d St., Williamsport, Pa.

"ISN'T IT A DAISY?"

"WHAT?"

Our New Catalogue.

"HAVEN'T SEEN IT?"

THEN SEND FOR IT.

H. H. MAYHEW CO., Shelburne Falls, Mass

THE FOX SAFETY RAZOR.

(U. S. Patent 484,116, October 11th, 1892.)

Is the finest and most practical in the world.

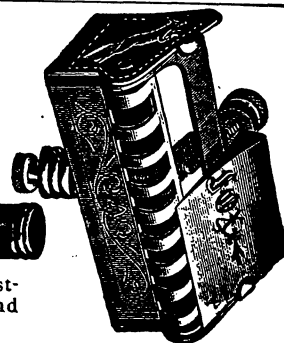
EVERY MAN HIS OWN BARBER.



Makes shaving a luxury; no danger of cutting. Adjust-
able blade. Silver plated frames. Sole manufacturer and
patentee.

E. LOTHAR SCHMITZ, 92 Reade St., New York.

Sold by all the Leading Hardware and Outlery Houses.



Underhill, Clinch & Co.,

94 Chambers St., New York.

O. Ames & Sons, Shovels, Spades and Scoops,

Chadborn & Coldwell Mfg. Co.'s Lawn Mowers.

Utica Tool Co.'s Hoes and Rakes.

Sheble & Klemm's Manure and Hay Forks.

David Wadsworth's Scythes.

English Riveted Scythes and Grass Hooks.

Malleable Iron Rakes,

Wooden Rakes,

Scythe Snaths, Scythe Stones,

Poultry Netting, Green Wire Cloth,

&c., &c., &c.

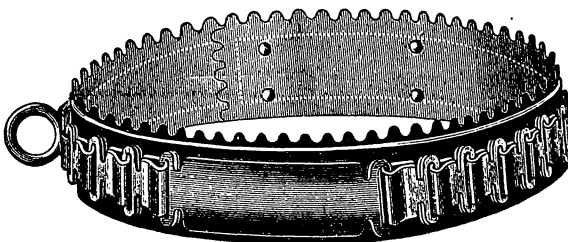
KELLEY'S PATENT DOG COLLARS,

**HALTER
CHAINS,**

Dog Leads

AND

Key Chains.



KELLEY & WOOLWORTH, Niagara Falls, N. Y.

J. R. TORREY & CO., Worcester, Mass.

New York Office: 74 Reade Street.



No. 8 X.

The **TORREY RAZOR STROPS** are known the world over as the standard for excellence in setting a fine edge. We manufacture and carry in stock more than 150 styles.

—Send for Illustrated Catalogue.—

BUCK BROTHERS' EXTRA

BUCK BROTHERS,

MILLBURY, MASS.

The Most Complete Assortment in the U. S. of

Shank, Socket Firmer and Socket Framing
Chisels.



TRADE MARK

PLANE IRONS.

CAUTION.—Buyers should be on their guard and not have inferior goods palmed on them by unprincipled persons who represent them as our make. Our tools are stamped "BUCK BROTHERS," and our labels have on our trade-mark also, "Riverlin Works."

Established 1825.

Incorporated 1892.

R. HEINISCH'S SONS CO.,

NEWARK, N. J., U. S. A.

New York office, No. 90 Chambers St.

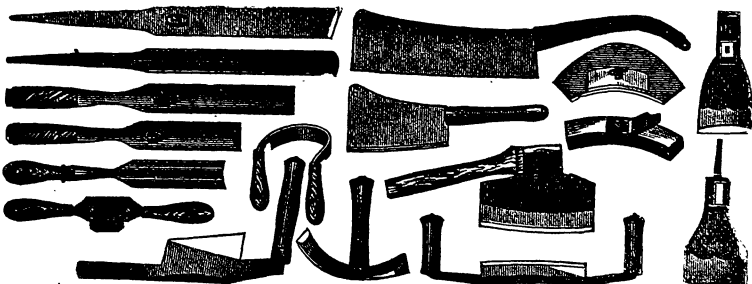
Tailors' Shears, Trimmers, Scissors, Tinnern's Snips, etc.

CATALOGUES AND PRICES ON APPLICATION.

**WE HAVE NO CONTRACT WITH
MESSRS. HERMANN BOKER & CO. AS
AGENTS FOR THE SALE OF OUR GOODS.**

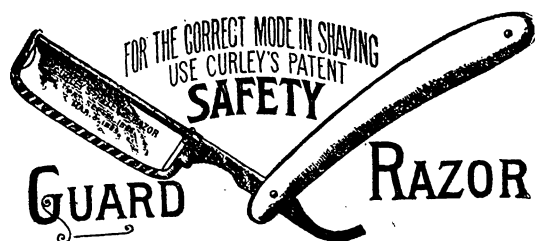
HIGHEST AWARD PARIS EXPOSITION, 1889.

ESTABLISHED 1837.
INCORPORATED 1892.



THE L. & I. J. WHITE CO.
BUFFALO, N. Y.

MANUFACTURERS
OF
Coopers', Carpenters' and Ship Tools, Plane Irons,
Cleavers, &c. Full Line Chisels.



FOR THE CORRECT MODE IN SHAVING
USE CURLEY'S PATENT
SAFETY

THIS improvement permits CORRECT SHAVING, therefore no irritation is caused, and the most inexperienced can shave with perfect safety.

We also carry the largest line in the United States of CUTLERY of every description.

J. CURLEY & BROTHER,
6 WARREN STREET, NEW YORK.

Cast Shears.

ACME SHEAR CO.,

BRIDGEPORT, - CONN.

MARTEN DOSCHER,
Commission Hardware.

88 Chambers St., New York.

Agent—G. W. Bradley's Edge Tools, Axes, Coopers' Tools, Cleavers, Bush Hooks, Draw Knives, Ship-Carpenters' Tools &c. Also a full stock of Planes, Brooks' Bright Wire Goods, Washita Stone and Taunton Tack Co.'s Rivets, &c.

ALASKA.

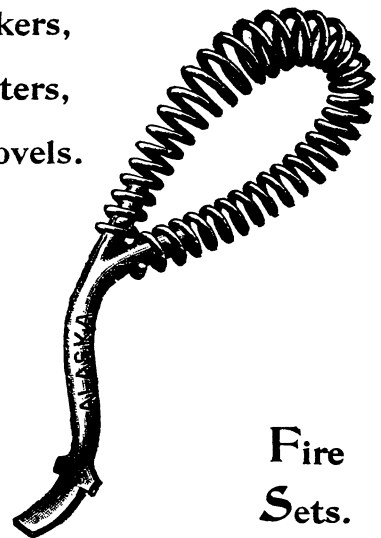
ALWAYS COLD.

Stove Trimmings.

Pokers,

Lifters,

Shovels.



Fire
Sets.

For Sale by All

First-class Jobbers in Hardware.

Made under Gaitly Patents and only by

Troy Nickel Works,
TROY, N. Y.

FRANCIS FROST & CO., Toronto, Ont.
Canadian Sales Agents.

**WHEN IN WANT OF
WOSTENHOLM'S
I★XL**

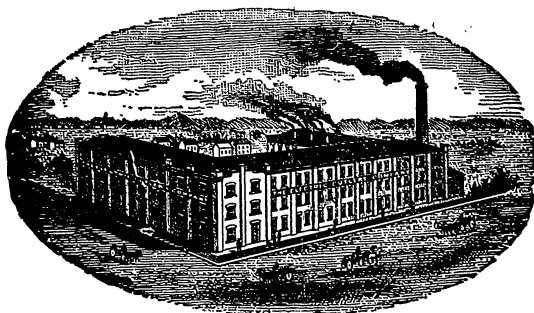


Knives or Razors,

SEND TO

FRED. B. GURNEY,
116 Chambers St., N. Y.

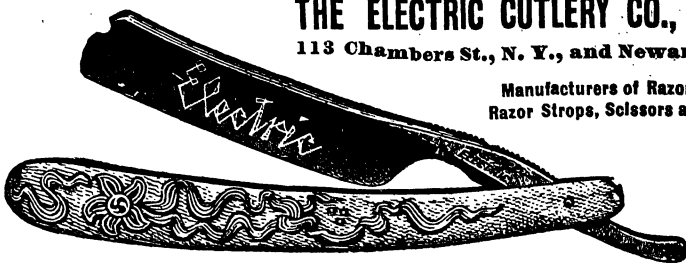
The Best Equipped Cutlery Works in the World.



FACTORY: FOURTH & DICKERSON STS. NEWARK, N. J.

THE ELECTRIC CUTLERY CO.,

113 Chambers St., N. Y., and Newark, N. J.

Manufacturers of Razors, Knives,
Razor Stropps, Scissors and Shears.

(SEND FOR CATALOGUES.)

NORTHAMPTON CUTLERY COMPANY, NORTHAMPTON, MASS.

NEW YORK

SALESROOM,



MANUFACTURERS OF

122 Chambers
Street.

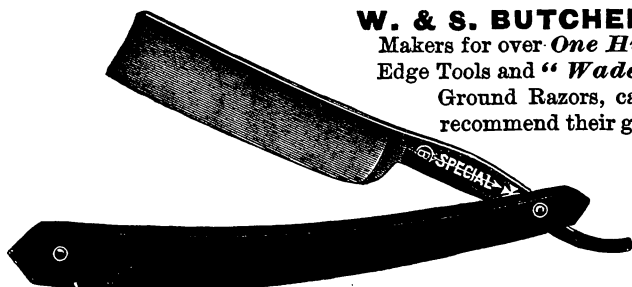
TABLE CUTLERY, BUTCHERS' CARVERS, PLATED GOODS, &c.

Send for Revised Catalogue.

W. & S. BUTCHER, Sheffield, England, and 185 Duane St., New York
Makers for over *One Hundred Years* of the celebrated "*W. Butcher*" Files and
Edge Tools and "*Wade & Butcher*" Razors, and the Original Manufacturers of Hollow
Ground Razors, can with confidence highly

recommend their goods and particularly their

Brand as being the most perfect *Extra Hollow Ground*
Razors ever manufactured and especially suited for the use of
Barbers and for private use. Genuine Razors are marked with
one of the following Corporate Trade-Marks:



WADE & BUTCHER
SHEFFIELD, ENGLAND

OR



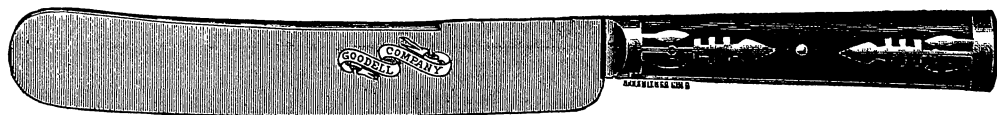
OR

FOR SALE BY ALL DEALERS IN HARDWARE, CUTLERY AND FANCY GOODS.

GRANITE STATE CUTLERY WORKS.

WE CLAIM

MANY POINTS OF SUPERIORITY OVER ANY OTHER
LINE OF CUTLERY.



Knives and Forks, Carvers, Butcher Knives, Butcher Steels, Skinning,
Sticking and Boning Knives, Butter and Cheese Knives, Butter Spades,
Hunting Knives, Bread, Putty, Cigar, Kitchen and

SHOE KNIVES.

A LARGE VARIETY.

Our New Catalogue Free to any Dealer.

GOODELL COMPANY,**ANTRIM, N. H.**

ALFORD & BERKELE CO., Agents, P. O. Box 2002. No. 77 Chambers Street, New York, N. Y.

HENRY KEIDEL & CO., Agents, 25 Hanover St., Baltimore, Md.

FAYETTE R. PLUMB,

Edge Tools,
Hammers

AND

Sledges.

Penna. R. R., Tucker and James Sts.

Manufacturer of



Main Office and Works

Railroad,
Miners'

AND

B. S. Tools.

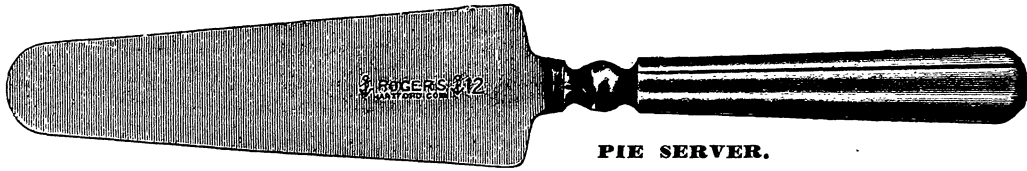
Philadelphia Pa., U. S. A.

—NONE BETTER—

THAN THE



SILVER PLATED WARE.



PIE SERVER.

MANUFACTURED BY

THE W. M. ROGERS MFG. CO.,

Office and Factory, HARTFORD, CONN. P. O. Drawer 30.

NEW CATALOGUE FOR THE ASKING.

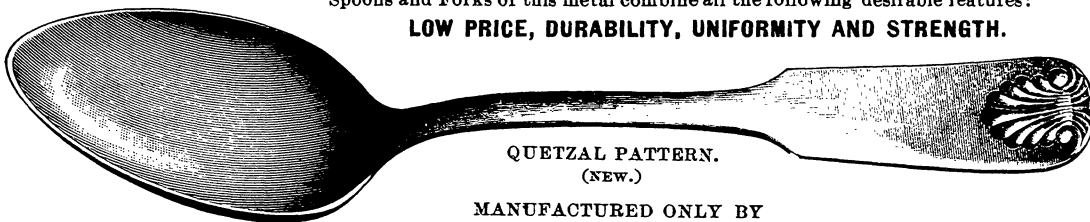
AZTEC COIN METAL

MADE INTO SPOONS AND FORKS.

Spoons and Forks of this metal combine all the following desirable features:

LOW PRICE, DURABILITY, UNIFORMITY AND STRENGTH.

AZTEC COIN METAL
has no plating to
wear off. Made
of solid metal.
Easily kept clean.

QUETZAL PATTERN.
(NEW.)

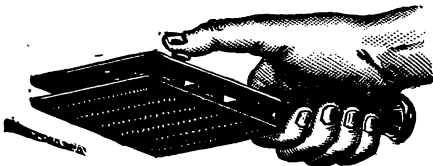
MANUFACTURED ONLY BY

THE HOLMES & EDWARDS SILVER CO.,

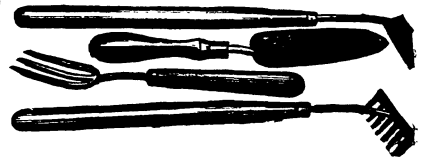
Bridgeport, Conn.

A full line of Boys' Garden Sets, Floral Sets
Kitchen Hardware and Hardware for Children's
Carriages.

Sole makers of the celebrated "Maud S."
Self-Cleaning Curry Comb.



B. B. NOYES & CO.,
Greenfield, Mass.



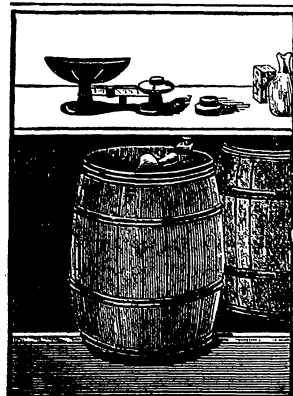
Send for full Catalogue and Prices.

GASOLINE & OIL
TORCHES.

TINNERS' & PLUMBERS
FURNACES.

PAINT
BURNERS.

THE DANGLER STOVE & MFG. CO., CLEVELAND, O.



Wonder Somebody Didn'

THINK OF IT BEFORE!

The Perfection Barrel Swing.

A simple device, readily attached to any Pantry,
Cupboard, Broad Shelf or under the counter in a Gro-
cery or Hardware Store, for swinging a barrel to get
at the contents easily. Price, \$1. All Hardware
dealers will supply them.

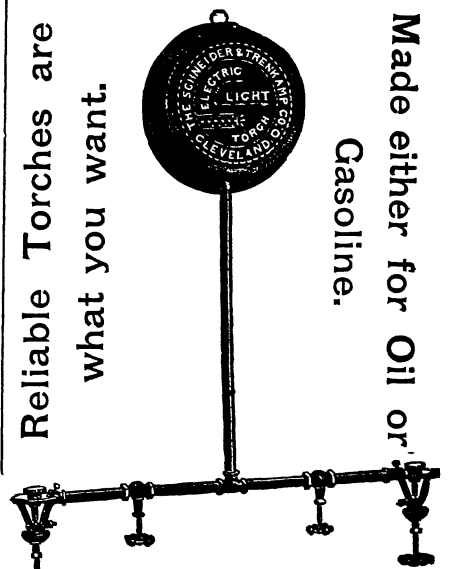
MANUFACTURED BY

THE LEAVITT MACHINE CO.

ORANGE, MASS.

Reliable Torches are
what you want.

Made either for Oil or
Gasoline.



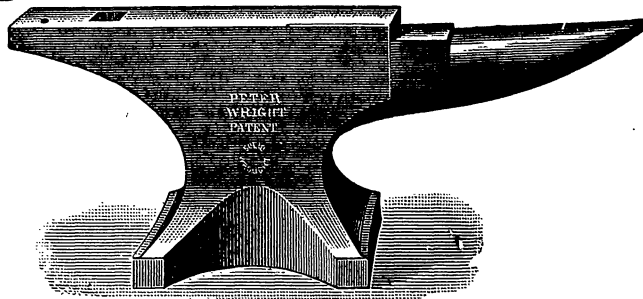
These Torches are particularly adapted for use in
Factories, Foundries, Machine Shops, Rolling Mills,
Blacksmith Shops, Warehouses, &c. They make a
strong white light, are free from smoke and are not
affected by wind or rain. They are convenient and
portable. These Torches can be run at an expense of
about one-half cent to one cent per hour, burning a
bright, steady light which is ten times greater than
the light of an ordinary gas burner.
Write us for prices. A liberal discount given to the
trade. Manufactured by
THE SCHNEIDER & TRENKAMP CO.,
Nos. 479 to 497 Case Ave., Cleveland, Ohio

Peter Wright's Patent Solid Wrought Anvil

PETER
WRIGHT
PATENT

SOLID
WROUGHT

Fac-Simile of Trade-Mark.



Fac-Simile of Green Label.

By Royal Letters Patent,

V. R.

PETER WRIGHT'S
SOLID WROUGHT
ANVIL
Made of Best Scrap Iron!
THE BICK FACE AND END ALL
IN ONE SOLID PIECE!

You are cautioned in buying to see that each anvil is stamped with the full trade-mark on one side and has the green label affixed to the other.

EXHIBIT STAND No. 167,
GROUP 71.

WORLD'S FAIR.

BRITISH SECTION,
MACHINERY BUILDING.

PETER WRIGHT & SONS, DUDLEY, ENGLAND.

HUDSON'S GARDEN HOSE MENDER.

Put up in Boxes for Family Use.

Each Box Contains 1 Pair Pliers, 6 Tubes, 20 Bands.

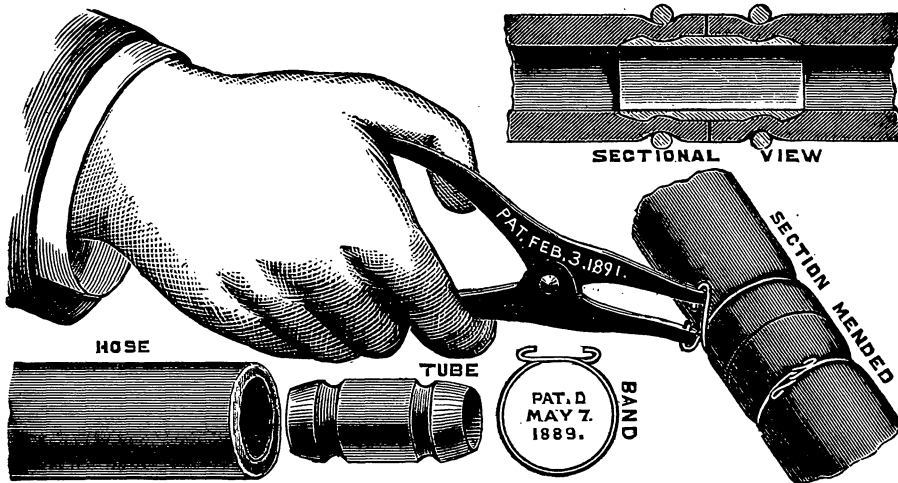
Hose can be mended or Couplings fastened on

**CHEAPER,
QUICKER and
MORE SECURELY**

than with any other device.

Screw menders tear the rubber lining from the hose. OURS will not. If you wish to handle a good thing with a good profit write for circular and prices.

C. E. HUDSON & CO.,
LEOMINSTER, - - - MASS.



outs, Kennel Chains, &c.; also cut to lengths for manufacturers' use.

The cut represents the exact size of 6/0.

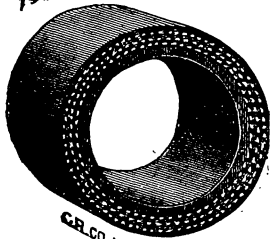
Thirteen Sizes made, 6/0 being the Largest.

The Bridgeport Chain Co.'s Triumph

Chain, made into Halters
Traces, Cow Ties, Tie-

**FACTORY AT
BRIDGEPORT, CONN.**

NEW SEAMLESS TUBE



Who Has Not Had Bad Hose?

Who has not lost time, patience, money, by attempting settlement for such goods?

THE CAUSE in nine cases out of ten is the lapped seam.
THE REMEDY is in buying our

PATENT SEAMLESS-TUBE HOSE,

made by machinery, the tube run like lead pipe, through a die. There is no lapped tube, no seam, no cracks, no defects; water cannot get through to rot the duck and cause the hose to burst.

Made in All Sizes and Kinds of Garden, Engine, Steam, Fire, Brewers' Cotton Hose, &c.

Order a Sample Bale of our Seamless-Tube Hose—Best in the World, costs no more than ordinary lapped-seam hose. The different colors, Red, White, Black, Green and Yellow, make a fine window or sidewalk attraction.

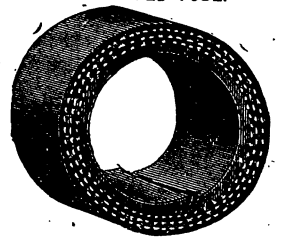
CLEVELAND RUBBER WORKS

of the Mechanical Rubber Co.,

CLEVELAND, O.,

Makers of Mechanical Rubber Goods, Clothing, Druggist's Sundries, Specialties, Etc.

OLD LAPPED TUBE.



SALES OF
Over Two Million Feet

—OF—
GARDEN HOSE

alone during the past year, distributed throughout the United States, and not a single piece complained of, justifies us in guaranteeing that it will give absolute satisfaction.

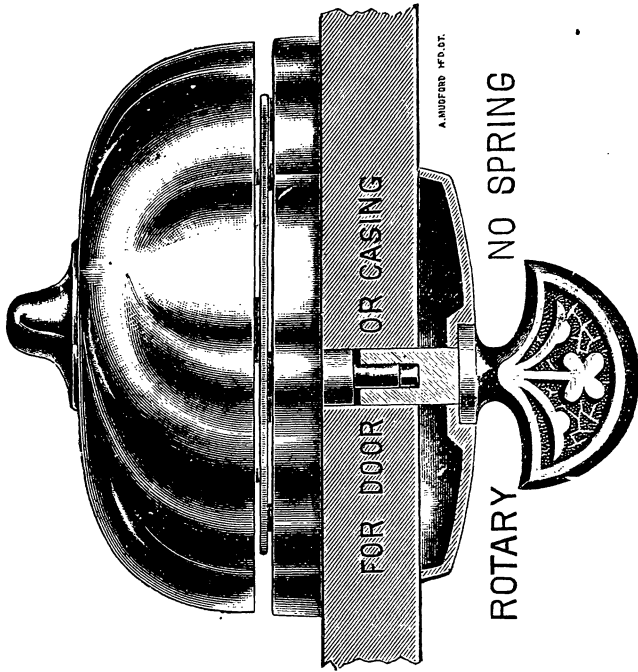
We were awarded an order of
25,000ft. for World's Fair

of our Celebrated
**Seamless-Tube
COTTON RUBBER-LINED HOSE.**

We Want Your Trade.
Send for 60-page Catalogue.
Write for Prices and Samples.

NEW DEPARTURE "ROTARY" DOOR BELLS. ELECTRICAL RESULTS.

(PATENTED JULY 14, 1891; MARCH 29, 1892.)



Simply turning the knob about ONE-FOURTH IN EITHER DIRECTION produces about TEN CLEAR, FULL tones, which, though not startling or annoying, can be better heard all through the house than any bell ever made to imitate Electrical Results.

3 INCH.

No. 91, - - - - - Nickel Plated.

No. 92, - - - - - Bronze Plated.

PER DOZEN, \$20.00

3 1-2 INCH.

No. 101, - - - - - Nickel Plated.

No. 102, - - - - - Bronze Plated.

PER DOZEN, \$24.00.

No. 101 and 102.

LIBERAL DISCOUNT TO THE TRADE.

JOHN H. GRAHAM & CO., 113 CHAMBERS ST., NEW YORK CITY.

GENERAL AGENTS.

A Triumph in Small Bore Rifles. STEVENS' "FAVORITE" RIFLE.



10 SHOTS AT 40 FEET. 10 SHOTS AT 40 FEET. 10 SHOTS AT 40 FEET.



25 STEVENS

ABOVE TARGETS ARE ACTUAL SIZE.

Made for the 22 or 25 Rim Fire Cartridge.

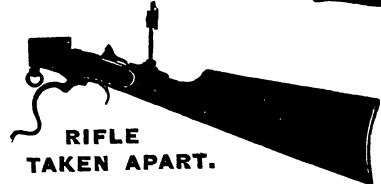


WEIGHT, 4 1/2 POUNDS.

22-INCH BARREL.

LEVER ACTION LIKE SHARPS.
TAKEN APART IN TEN SECONDS.

IT IS SIMPLY IMPOSSIBLE

TO MAKE MORE
ACCURATE SHOOTING BARRELS
THAN ARE ON THIS RIFLE.RIFLE
TAKEN APART.

No. 17. Plain Open Sights.....\$12.50

No. 18. Vernier, Open Back, and Beach Front Sights..... 17.00

No. 19. Lyman Peep, Open Back, and Lyman Front Sights, 17.00

A 60 Page Catalog showing our full line of Fire Arms with TRADE PRICE LIST sent with pleasure to all dealers.

J. Stevens Arms & Tool Co.,

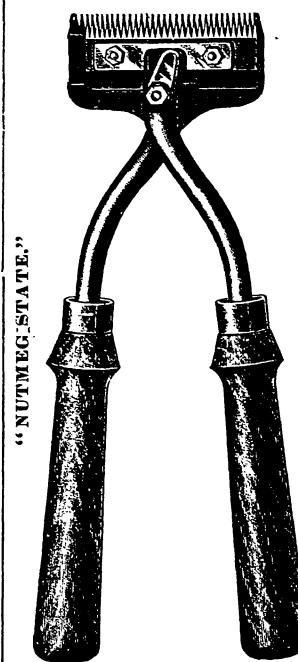
P. O. Box 5729.

Chicopee Falls, Mass. U. S. A.

Edward S. Hotchkiss,

MANUFACTURER OF HARDWARE,

BRIDGEPORT, CONN.



"NUTMEG STATE."

SATISFACTORY PRICES. Standard goods. Don't fail to write when in want of Horse and Barber's Clippers, No. 20 Steel Rat Killers, Curry Combs, Metal and Wood Choker Mouse Traps Lemon Squeezers, Baxter Pattern Wrenches, &c., &c.

AMERICAN TOOL COMPANY,
NEW YORK,

MANUFACTURERS OF

TOOL CHESTS

Of all sizes, complete with tools, for Hardware, Toy Notion and Variety trades.

Factory and Salesroom,

200 West Houston Street, near Varick.
Also Machinists' Tool Chests, empty. Illustrated Catalogue and prices furnished on application.



JONATHAN CROOKES & SON,

SHEFFIELD, ENGLAND,

Have placed the Agency for the United States for the sale of their celebrated

POCKET KNIVES, RAZORS, Etc.,

—: WITH :—

DAME, STODDARD & KENDALL, 374 Washington St., Boston, Mass.,

Who intend issuing a new list at reduced prices which will embrace many new styles.

— ALSO DIRECT IMPORTERS OF ALL KINDS —

English, German, French and Swedish Cutlery.



This GUN has rebounding locks and the barrels can be taken off and put on again without cocking the arm, and when cocked the hammers may be let down gradually, and without the full force of the blow. It is simple in construction, having very many less pieces than any other hammerless gun.

**Easily Tipped and Cocked,
 Damascus Barrels,
 Handsomely Engraved,
 Italian Walnut Stock.**

**SEND FOR DESCRIPTIVE
 CATALOGUE.**



New Hammerless Double Gun,

MANUFACTURED BY

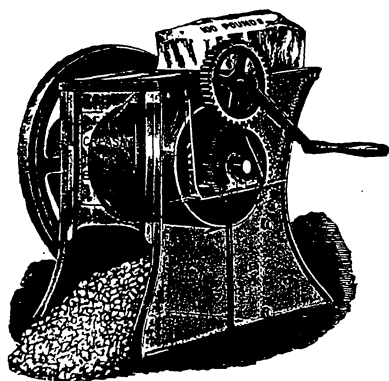
FOREHAND ARMS CO.

Worcester, Mass., U.S.A.

PRICE VERY LOW.

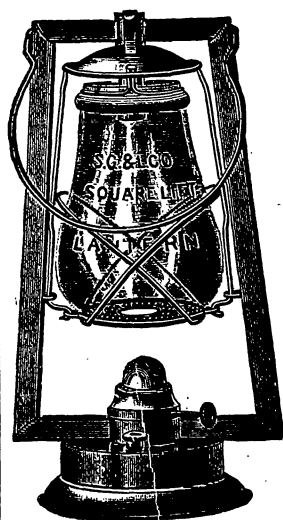
CREASEY ICE BREAKERS.

HAND OR POWER. 7 Sizes.



No. 1 (Hand or Power) Machine.

Jos. S. Lovering Wharton,
 MANUFACTURER,
 GERMANTOWN JUNCTION,
 PHILADELPHIA, PA.



Square Lift Wire Lan-
 tern. Open.

Steam Gauge and Lantern Co.

Syracuse, N. Y.

Western Branch: 25 Lake St., Chicago, Ill.

—MANUFACTURERS OF—

Standard Tubular Lamps and Lanterns.

THE BEST IN THE WORLD.

Tubular Lanterns,

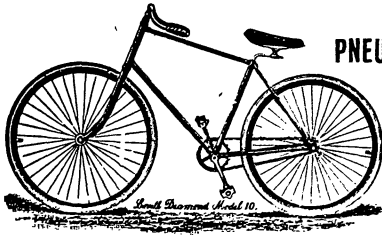
Tubular Street Lamps,

Tubular Hanging Lamps,

Tubular Station Lamps,

Tubular Driving Lamps, etc.

Lovell Diamond Cycles



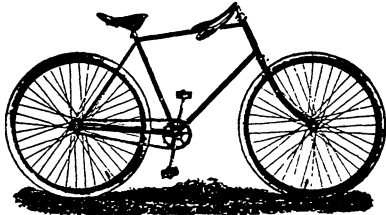
HIGHEST GRADE.
PNEUMATIC, CUSHION AND SOLID TIRES.
FOR LADIES AND GENTLEMEN

MANUFACTURED BY
John P. Lovell Arms Co.

BOSTON, MASS.
CYCLE CATALOGUE FREE.

WESTERN WHEEL WORKS.

BICYCLE



MANF'TRS

From \$20

to \$135.

MOST COMPLETE LINE MADE.

OFFICE AND FACTORY:

Wells, Schiller and Sigel Sts., and N. Park Ave., Chicago, Ill., U.S.A.

Dauntless Bicycles

THE TOLEDO BICYCLE CO., - TOLEDO, OHIO.

SELL
ON SIGHT.
For the reason,
get Book
and Price.

FALCON JUNIOR, for Boys. FALCON JUNIOR COMBINATION, for Boys and Girls.

The only high grade juvenile wheels made. Full ball bearings, perfectly dust proof, $1\frac{1}{2}$ in pneumatic tire, 24 in. wheels, graceful drop handle bars, combination cork and rubber handles.

The bearings are turned out of solid bar steel, and all material and workmanship are first-class. Made in the same manner, of the same stock, with the same care as the large wheels. Good juvenile wheels are scarce, and ours are going rapidly.

The W. Bingham Company, CLEVELAND, OHIO.

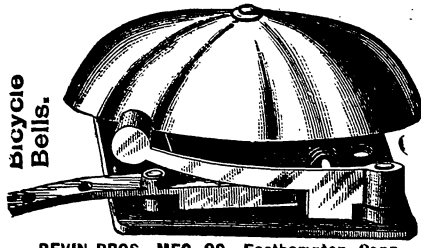


**Bicycle Locks.
Bicycle Bells.**

Especially Low Prices.

We manufacture
hardware specialties
of all descriptions to
order.

HAINES & ZIMMERMANN, 407 Cherry St., Phila.



Bicycle
Bells.

BEVIN BROS. MFG. CO., Easthampton, Conn.
Manufacturers of

Sleigh Bells, House Tea, Hand, Gong Bells, &c.

Yacht AND Boat Hardware.

L. W. FERDINAND & CO.,

BOSTON, MASS.
Send for 212-Page Catalogue.



To Make a Bull's Eye

In Your Business or at the Range?

If you deal in ARMS or AMMUNITION or shoot a Rifle, Pistol or Shot Gun, you will make a HIT by sending for the IDEAL HAND BOOK.

IDEAL MFG. CO., New Haven, Ct., U. S. A.

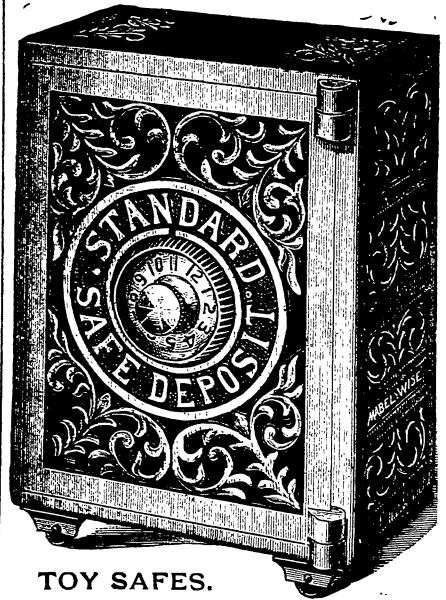
Please mention The Iron Age when you write.

The HENRY C. HART MFG. CO.,

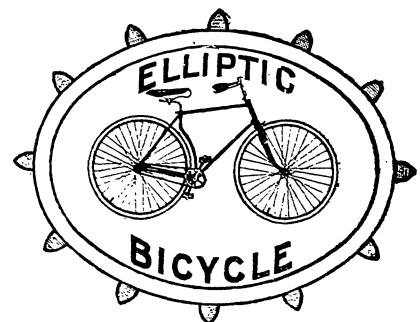
DETROIT, MICH.

MANUFACTURERS OF

Hardware Specialties.



TOY SAFES.



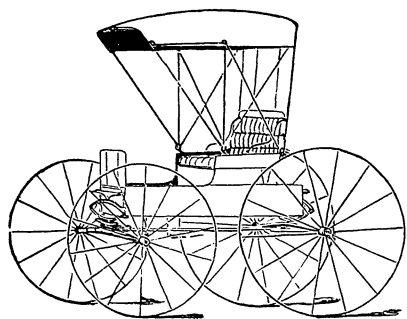
WORLD'S RECORDS.

1-4 Mile, flying start,	:26 1-5	ONE
1-4 " standing start,	:30	MILE,
1-2 " flying start,	:55 1-2	
1-2 " standing start,	:58 3-5	
1 " flying start,	1:56 3-5	1:56 3-5.
1 " standing start,	2:04 3-5	

SEND FOR CATALOGUE.

FREEPORT BICYCLE MFG. CO.

Freeport, Ill



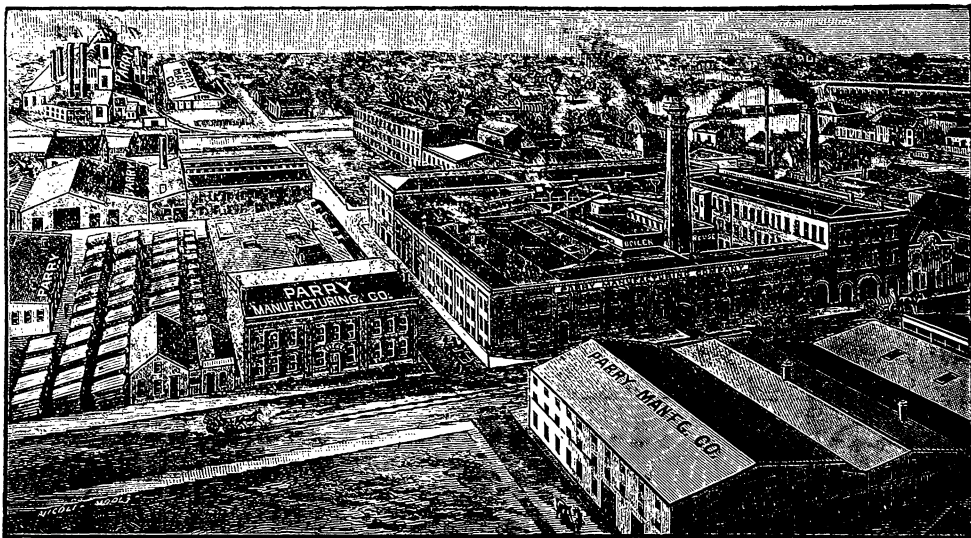
The Hardware Trade

Can buy this buggy for L. E. X X.
 Retails for \$75.00.

PARRY MFG. CO.,

Indianapolis, Ind.

The
 Largest
 and
 Best Equipped
 Factory
 on Earth
 for
 Producing
 Superior
 Vehicles.

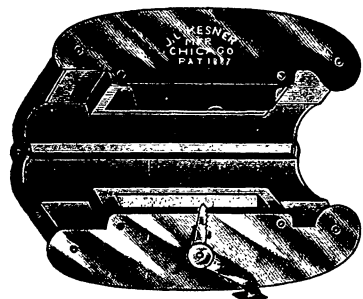


KESNER'S ALWAYS COOL SAD IRON HOLDER.

Indispensable to every Housekeeper and Laundry. Sells at sight and pays the Dealer a Large Profit. They pack closely and ship cheaply. Every Holder Guaranteed to give Absolute Satisfaction.

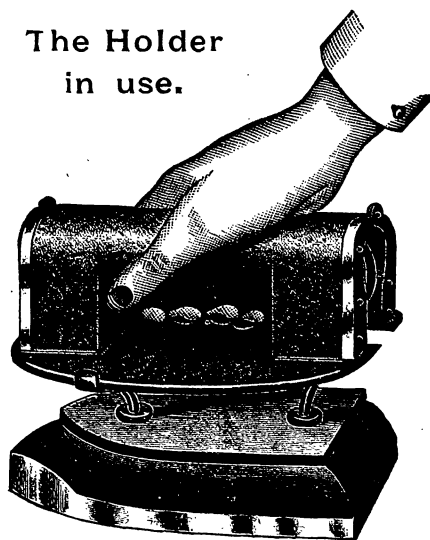
It is the best and only perfect Iron Holder made. It is strong, durable, unburnable, and will fit the handle of any Sad Iron. It never gets hot—**ALWAYS COOL**—instantly applied and self adjustable. Fastens with spring latch and opens with an automatic spring.

It is made on a two-part wood frame covered with heavy duck. The inside is lined with asbestos—a positive non-conductor of heat. When closed on the handle of the iron an extra heavy nickel plated brass shield prevents the heat from striking the hand.



Patented Oct. 25th, 1887, and others pending.

The Holder
 in use.



SOLD BY ALL HARDWARE JOBBERS

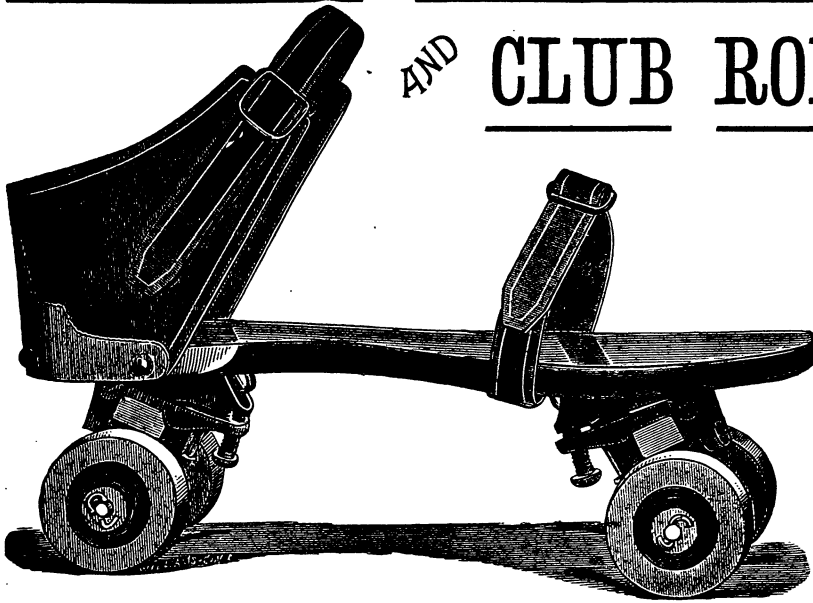
If your jobber does not carry them, order a sample gross direct from us. No dealer can afford to be without them.

For Circulars, Testimonials and Price-List write the Manufacturers,

J. L. KESNER & CO.,

76-78 E. Illinois Street, CHICAGO, ILL.

HENLEY'S CELEBRATED RINK AND CLUB ROLLER SKATES.



A full, new and complete stock of Roller Skates, Skate Repairs and Rink Supplies. Address for 80 page catalogue and prices,

M. C. Henley,

RICHMOND, IND.

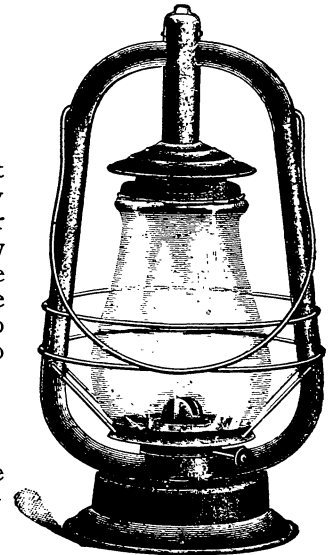
Some Jobbers



Say they have not fared measurably well the past season, and that things have been bad, mighty bad, owing to cutthroat competition from their rascally competitors. They should brace up now and remember that the Ohio Lantern Co. have been cheerfully lying wake o' nights for the past few months, contriving a very long pole to be put in the hands of any nice feeble jobber who may be fond of persimmons.

"THE SURPRISE TUBULAR"

is the great attraction, but we have the whole line right through. Drop us a line.



OHIO LANTERN CO.,

=

=

=

Tiffin, Ohio.

SURPRISE TUBULAR.

ESTABLISHED 1840.

A WORD TO THE WISE IS SUFFICIENT.

When you purchase a Lantern, Street Lamp or Driving Lamp, remember the

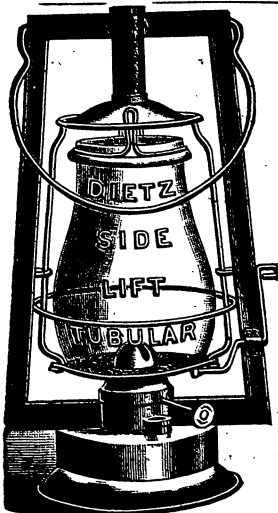
"DIETZ" Make

is the best. Our goods have stood the test of time and are safe and reliable. The name "DIETZ" is plainly stamped on them. Our specialty is Tubular Lanterns, Street Lamps and Driving Lamps. We make a large variety being the oldest and largest house in our line.

ASK FOR THEM!

R. E. DIETZ COMPANY,

New York, 60 Lighthouse St. U. S. A. Chicago, 25 Lake St.



DETROIT CORK-SCREW CO., DETROIT, MICH., U. S. A.

Manufacturers of

The Davis Cork-Screw,
The Davis Knife and Cork-Screw,
The Puddefoot Cork-Screw,
Columbus and Greely
Cork Extractors.

Manufacturers of

Cut Worm
Spiral Screws and
Cork-Screw Novelties.
Cut Worm Cork-Screws
for the Bar Cork Puller

Send for Price-List and Discounts.

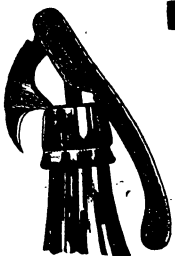


FIG. 3. Showing Davis cork-screw and fulcrum in position to pull cork.

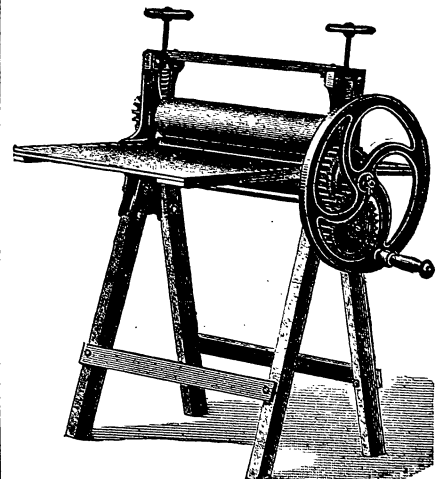
The Family Mangle.

WARRANTED TO DO

Better Work than Hand-work.

SAVES all the fuel.
two-thirds the work.
Keeps the linen whiter.

We Guarantee Every Machine.



Send for descriptive circular of

THE LANG MFG. CO., Racine, Wis.

Agents Wanted.

The Cottage Souvenir No. 2.

A Repository of Artistic Cottage Architecture and Miscellaneous Designs: By GEO. F. BARBER Architect; 168 pages, 8½ x 11 inches; paper, \$2; cloth, \$2.75.

The author's aim in preparing this work has been to present a series of thoroughly modern designs of houses which are adapted to the wants of the people in every section of the country and which are models of compactness and convenience of arrangement. Estimates of cost are presented with the plans, and will be found to range from \$400 to \$8000. The plans are greatly diversified, architectural beauty and proportion being carefully observed. In connection with the fine collection of miscellaneous designs which make up part of the book it forms one of the best of its kind, and is commended as such by builders from various directions. Hints to home builders and remarks upon the principles of design, harmony of form and proportion in architecture are a feature.

Convenient Houses, With Fifty Plans for the Housekeeper.

By LOUIS H. GIBSON, Architect; 321 pages, 7 x 9 inches; cloth, \$2.50

This volume comprises a large variety of plans, photographic designs and artistic interiors and exteriors of ideal homes, varying in cost from \$1000 to \$10,000. It is divided into six parts, as follows: The architect and housewife; a journey through the house; plans of fifty convenient houses; practical house building; business points in building; how to secure a home. The plans are prepared from a standpoint of convenience, stability and beauty of surroundings.

AUTHOR'S PREFACE.

"When the reader is familiar with the writer's general purposes, it is easier to understand the details of his work. This book is intended to deal with houses in a housekeeping spirit. In doing this the architect has in mind convenience, stability, and that ideal of housekeepers—beauty of surroundings. In carrying out this idea, the relation of architecture to good and economical housekeeping is first considered. Following this division is 'A Journey through the House.' It begins at the porch, moves through the different rooms and stops to consider the various details. This brings about not only a consideration of the general arrangement of a house, but such details as kitchens and pantries, plumbing, laundry and heating. These first two sections of the book—'The Architect and the Housewife,' and 'A Journey through the House,'—are, in a measure, educational. After this, and in keeping with the general principles that have been set forth, plans of fifty convenient houses are illustrated and described. For the most part they are houses that have been built. The next section is devoted to practical house building. It is constructed by taking a complete specification for everything which may concern a dwelling house, and ridding it, as far as possible, of all technicalities; thus putting in form all practical house-building questions for the benefit of the owner. Following this is the consideration of business points in building, which sets forth methods of letting contracts with the view of securing the best results without waste of money. The closing section is devoted to the getting of a home—how to arrange the monthly payment schemes, building-association plans and other methods for getting a house on easy installments."

Suburban and Country Homes.

Containing Forty-Five Plates showing designs for houses of moderate cost, with descriptive letterpress, contributed by various architects, together with the following articles: "Suggestions on House

Building." By ALBERT WINSLOW COBB, Architect; and "How to Plumb a Suburban House Safely, Economically and Effectively," together with Plans and Specifications. By LEONARD D. HOSFORD.

Cloth, 10 x 12 inches, \$3.00.

The many attractive towns adjacent to our great cities illustrate the thought and skill that is now being brought to bear in regard to the planning and designing of our suburban homes. In preparing this book the object has been to present to the intending builder the necessary information and steps to follow so that the best results might be attained. The designs shown represent the efforts of nineteen architects who have made a special study of the subject. Each design is fully described and accompanied by elevations and plans. In many cases the cost given is the actual amount of contract. In others estimates and in some bills of material are given.

Cottages; or Hints on Economical Building.

Compiled and edited by A. W. BRUNNER, Architect; 24 plates, contributed by different New York architects, and 54 pages of text; 6 x 9 inches, cloth, \$1.

A number of designs and sketches are presented in this little book of medium and low cost country houses adapted to meet the ideas of those wanting inexpensive homes, which at the same time shall be picturesque and convenient. The first four plates show designs of very simple cottages of from four to six rooms, costing from \$600 to \$1000. In plates V to X the designs embrace cottages of slightly larger size, with three rooms on the first floor, the estimated cost not exceeding \$2000. Plates XI to XIX include various designs, all differing greatly in plan and exterior treatment, yet keeping strictly within the range of medium-cost houses. The last four plates give designs for double or semi-detached houses. The descriptive text includes practical suggestions for cottage building. A chapter by Wm. Paul Gerhard is added upon the water supply, drainage, sewerage, heating, ventilation and other sanitary questions relating to country houses.

Sent, post-paid, on receipt of price, by

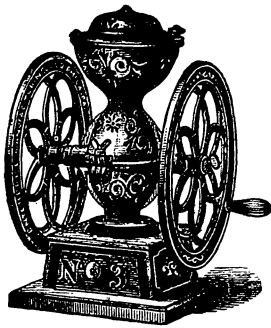
DAVID WILLIAMS, - - - Publisher and Bookseller,
96-102 Reade Street, New York.

THE ENTERPRISE M'F'G CO. OF PA.,

THIRD AND DAUPHIN STREETS, PHILADELPHIA.

COFFEE MILLS.

24 Sizes.



\$1.25 to \$100.00.

FRUIT PRESS.

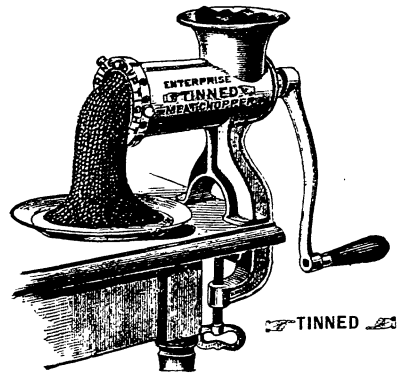
4 SIZES.



No. 24. Price, \$3.00

MEAT CHOPPERS.

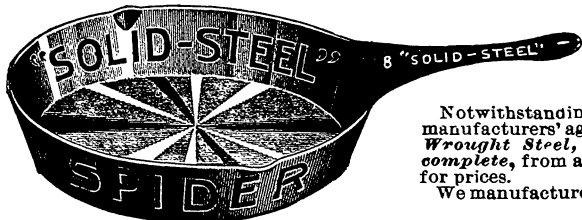
15 Sizes.



\$2.00 to \$275.00.

FOR SALE BY THE HARDWARE TRADE. SEND FOR OUR LATEST CATALOGUE.

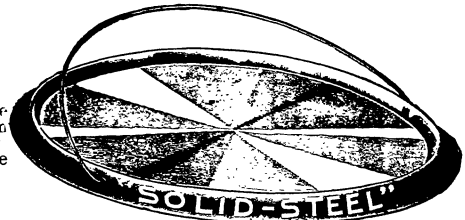
"SOLID-STEEL" SEAMLESS HOLLOW WARE.



No Seams, no Rivets in "Solid-Steel" Ware.

BRILLIANT FINISH.

Notwithstanding the claims made by some manufacturers' agents, our spiders are made from *Wrought Steel, Without Seams or Rivets complete, from a single piece of metal.* Write for prices. We manufacture our own goods.



Made either with Balls or Solid Handles.

The Cleveland Stamping & Tool Co., Cleveland, O.

We are in shape to figure on light and heavy stamping, and in addition to the above we build Dies and Stamping Machinery.

ADJUSTABLE KNIFE

DIRECTIONS
LOOSEN BOLTS.
SET KNIVES FOR DESIRED CUT.
(TIGHTEN BOLTS)

TUCKER & DORSEY MFG. CO.

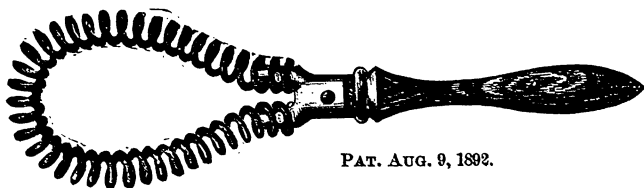
KRAUT CUTTER

PATENT APPLIED FOR.

PERFECT.
SIMPLE.
HANDSOME.

TUCKER & DORSEY MFG. CO. INDIANAPOLIS, IND.

THE BOSS DUST BEATER.



PAT. AUG. 9, 1892.

NEAT, DURABLE, AND DOES THE BUSINESS.

For removing dust and filth from Clothing, Upholstered Furniture, Rugs and Carpets it is just the thing. Will raise the nap and so improve the appearance. Will not, like other Dust Beaters, leave marks, nor tear the fabric. The coil is of steel wire secured in a malleable iron socket and attached to an enameled wooden handle. Just what everybody wants.

Retail Price, 25 Cents. Sent by Mail, 35 Cents.

PEABODY & PARKS,
Manufacturers,
TROY, N. Y.

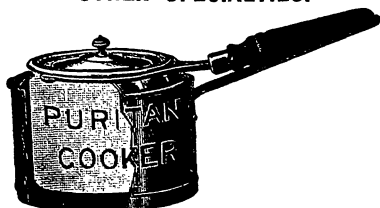
1893 CATALOGUE
JUST OUT
HOLLOW WARE and HARD
WARE SPECIALTIES.
The STUART & PETERSON CO.
PHILADELPHIA, PA., U. S. A.

American Stamping Co.,

Manufacturers of

All Kinds of Tinware and Sheet
Metal Goods.

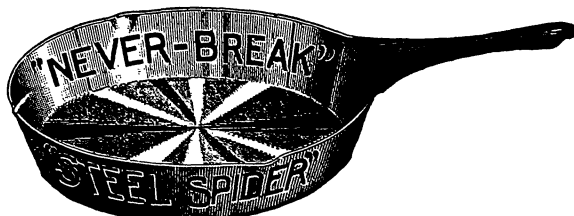
N. Y. Office and Salesroom, 104 & 106 John St.
Factory, 103 to 119 N. 3d St., Brooklyn, E. D., N. Y.

"PURITAN"COOKERS, COFFEE POTS AND
OTHER SPECIALTIES.Cooks Quicker than any other
Porcelain Rice Boiler made.**"NEVER-BREAK"**

Wrought Steel Spiders

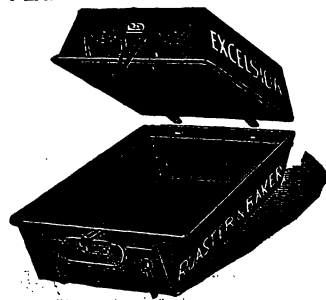
Wrought Steel Griddles, Kettles, Stew Pans, Stew Pots, Maslins,
Scotch Bowls, Hotel Sauce Pans, &c.

MIRROR POLISHED—TINNED—PORCELAINED.

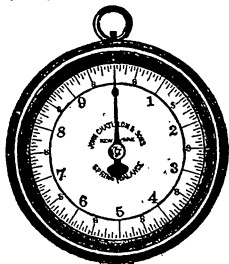
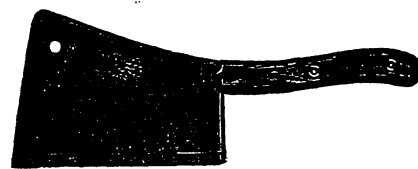


"MIRROR POLISH," the only Perfect Plain Steel Finish

SOLE MANUFACTURERS

THE BRONSON SUPPLY COMPANY,
CLEVELAND AND NEW YORK.**"EXCELSIOR"**Roasting and Baking Pan.
PLANISHED and PLAIN STEEL.**John Chatillon
& Sons,**

85, 87, 89, 91, 93 CLIFF ST., NEW YORK.

ESTABLISHED
1835.SEND FOR
PRICE LIST.Sole Agents for
Foster Bro.'s Butchers' Cutlery.**John Chatillon & Sons, N. Y.****A. S. HENN & CO.,**

Manufacturers of

Hardware Specialties, Can Open-
ers, Pocket Wrenches, Mincing
Knives, Clothes Line Pulleys, &c.

Send for Catalogue.

NEW HAVEN, CONN.

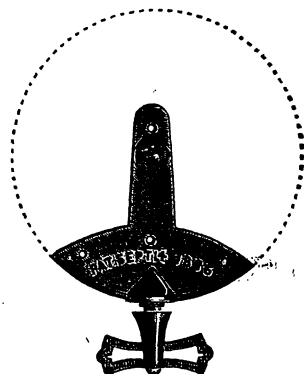
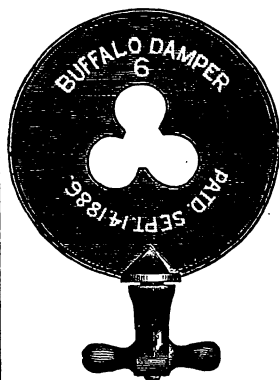
**THE BUFFALO DAMPER**

SAVES

TIME AND TEMPER.

SIMPLE,
SINGLE BEARING,
EASILY PUT IN.

ONLY ONE HOLE IN PIPE.

**THE BUFFALO DAMPER CLIP**Indispensable to Furnace Workers. With it a Perfect Damper of any size
may be easily made. Write for prices.

All DAMPERS or DAMPER CLIPS supplied with wood or metal handles, as desired.

—SOLE MANUFACTURERS,—

SIDNEY SHEPARD & CO.,

Buffalo, N. Y.,

Proprietors of the BUFFALO STAMPING WORKS.

SAMPLE ORDERS SOLICITED.

BUSINESS ESTABLISHED
1798.INCORPORATED
1891.**JOS. F. McCOY CO.**

26 Warren St., New York,

—Importers and Dealers in—

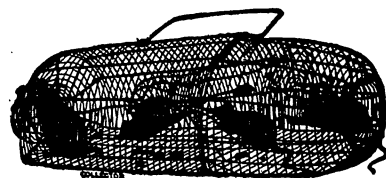
HARDWARE, CUTLERY, TOOLS

—AND—

RAILWAY SPECIALTIES.

Headquarters for

- | | |
|--|---|
| POCKET CUTLERY,
SCISSORS and TOOLS. | Monarch Cutlery Co.
Irving Cutlery Co. |
| RAZORS, TABLE CUTLERY. | George Butler & Co. |
| SHEARS and SCISSORS. | Warrington Shear Co. |
| FRENCH BAND SAWS,
TOOLS, &c. | Peugeot Frères. |
| FRENCH PLYERS and
JEWELERS' TOOLS. | Gueutal & Sons. |
| PATENT CLIPPERS for
HORSES and BARBERS. | Coates Clipper Mfg.
Co. |
| HYDRAULIC JACKS,
BLOCKS and HOISTS. | Tangyes, Limited. |
| PATENT DIFFERENTIAL
PULLEY BLOCKS. | Wm. Eades & Co. |
| RATCHET DRILLS. | Weston's Patent. |
| BRASS WIRE CLOTH. | Weiller & Co. |

**SHEETS,
COOKING UTENSILS,
MEDALS,**Sheets and Rivets for Boats
and Coffins.**Bars for Horse Shoes.****ILLINOIS PURE ALUMINUM CO.,**
LEMONT, ILLINOIS.**GENUINE MARTY** **RAT AND
MOUSE
TRAPS**
ALWAYS IN STOCK.**THEY DO THE WORK.**
Orders solicited. Prices on application.
BURDITT & WILLIAMS,
20 Dock Square, Boston, Mass.
—SOLE AGENTS AND IMPORTERS.—



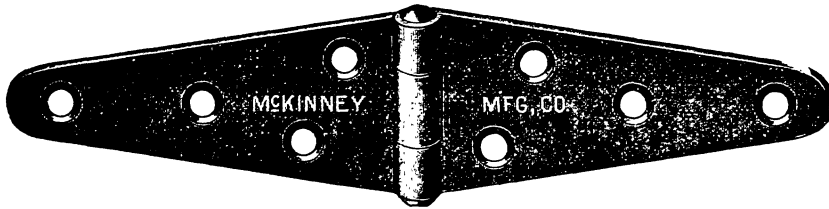
WE CLAIM



That one pair of our Celebrated Steel Hinges will outwear two pair of the Flimsy Invention now being forced upon the attention of the trade.

McKINNEY MFG. CO., ALLEGHENY, PA.

Steel

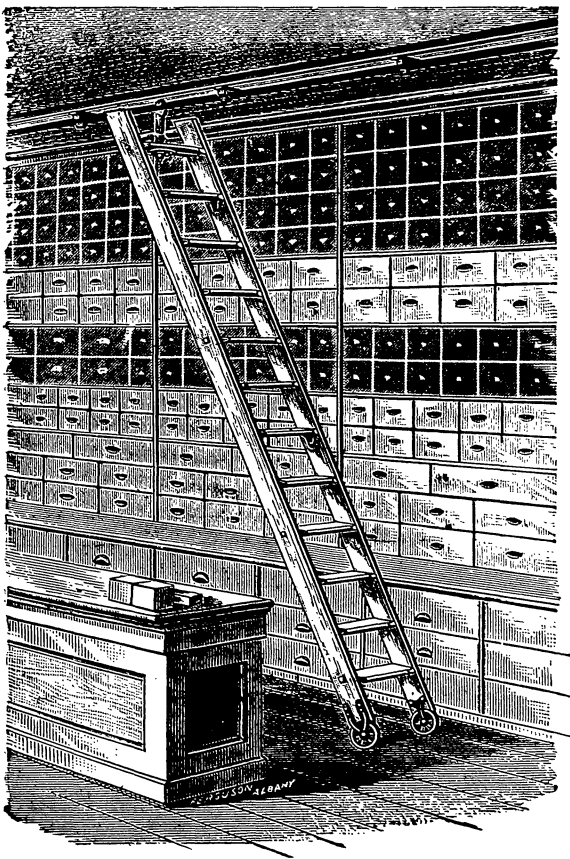


Hinges.

SEND FOR LIST.

"NONE BETTER."

THE "NOISELESS" STORE LADDER.

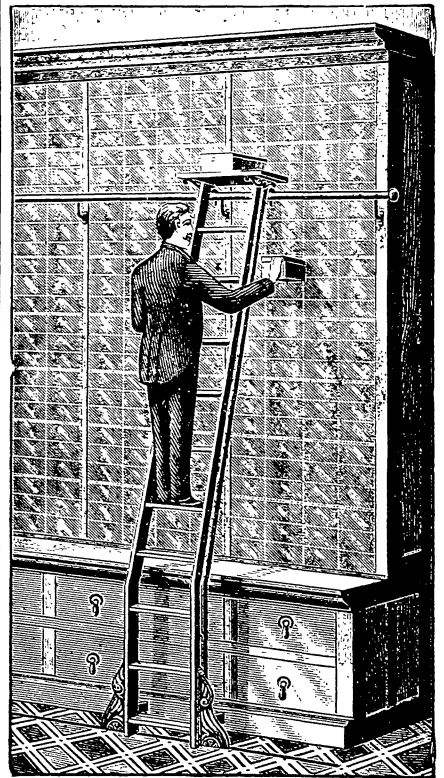


The latest and best. Perfectly noiseless. Neat in appearance.

Manufactured by

M. CROISSANT,

ALBANY, N. Y.



FLOOR TRACK BICYCLE LADDER.

No other Ladder Service can approach the "Bicycle" in ease and convenience of operation. Compared with others they work like a bicycle beside a lumber wagon.

Can be applied to any kind of shelving made.

See this space next week for other styles.

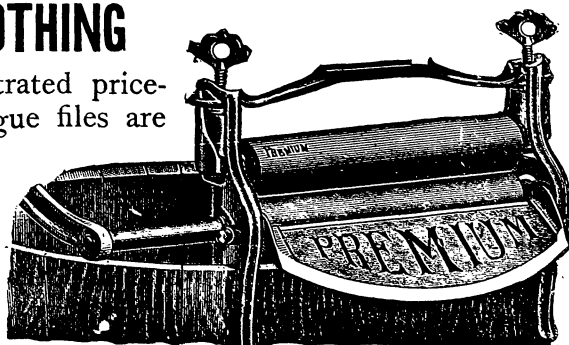
Send for Illustrated Catalogue and prices to

THE BICYCLE STEP LADDER CO.,

50 State street, Chicago, Ill.

IT COSTS NOTHING

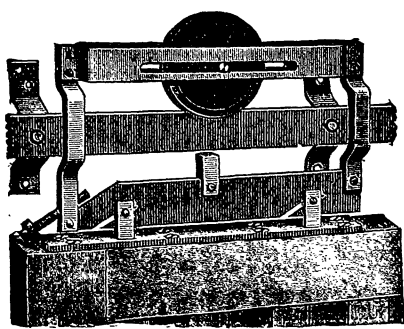
to send for our illustrated price-list, and your catalogue files are incomplete without it. Write to the Factory, Montpelier, Vt., or to our Chicago store, 68 Lake St.



COLBY WRINGER COMPANY.

NO MORE DULL CARVERS.
THE BEST TABLE TOOL FOR KEEPING CARVING KNIVES IN GOOD CUTTING ORDER—THE EMPIRE VITRIFIED STEEL WITH 1/4" BACKBONE.
CANNOT BREAK—LASTS A LIFETIME AND WILL NOT GLAZE.
SENT BY MAIL FOR 50¢.
EMPIRE PORTABLE FORGE CO.
LANSINGBURGH, N. Y.

N. Y. Office, 103 Chambers St., W. H. QUINN, Manager



LANE'S PATENT NOISELESS STEEL PARLOR DOOR HANGER.

This Hanger is made of Steel.
The Wheel is also Steel, except the filling or tread.
The Track is of Steel—a single one only.
The Hanger is Anti-Friction.
More nearly Noiseless than any other.
Ease of adjustment.

Can be erected with half the labor others require.
Track will not swell, shrink or warp out of true.
No cutting of doors.
No matching of hardware.
Simplicity in all its parts.
Durability.

ALSO LANE BARN DOOR HANGER AND TRACK. SEND FOR CIRCULARS.

Manufactured by

LANE BROS., Poughkeepsie, N. Y.
JOHN H. GRAHAM & CO., General Agents, 113 Chambers St., New York.

**"Friends,
Romans,
Countrymen!"**

Lend Me Your Ears."

So spoke Marc Antony a few years ago at the burial of the immortal Caesar. We did not commence as long ago as our friend Antony, but we have done a power of talking. He had the ears he wanted in front of him, while we have to do our talking by proxy; but like our worthy friend Marc, we get there just the same. You have heard us talking about

THE CRAIG LOCKS

for six or eight months only, but you didn't know that we had a factory and force of hands working on these locks for two years before we even attempted to sell a lock, as we intended to sell a perfect lock or none at all; so that when we guarantee these locks you can be sure we know what we are talking about. We also know what we are talking about when we say that every Tom, Dick and Harry cannot open these locks with a bent wire or anything else. When your customers want a lock that will stay locked until they get ready to open it, you sell them **THE CRAIG**. We guarantee the lock to you and you can guarantee it to the customer. It won't come back. You don't have to explain how it works. The directions in each box are plain enough for any child to understand. Suppose you send for a catalogue and let us get acquainted.

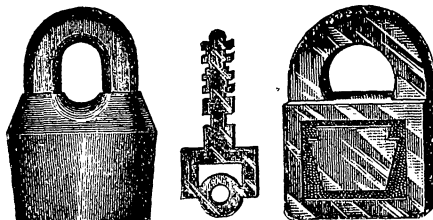
KEYLESS LOCK CO., - I. A. 197 South Canal St., Chicago, Ill.

KEYSTONE LOCK WORKS,

— Established 1879. —

E. T. FRAIM, Lancaster, Pa., U. S. A.

MANUFACTURER OF



Patent Inter-Locking Tumbler Scandinavian or Jail **PADLOCKS**, in 56 grades and sizes. Key and **Self-Locking**. Brass, Bronze, Steel and Malleable Iron. Red, Black, Bower-Barff and Bright Brown finish. Also a full line of fine flat padlocks in Bronze and Steel. All fully described and illustrated in our new catalogue, furnished free to the trade.

SURPLESS, DUNN & ALDER,

General Agents, 97 Chambers St. New York

HARDWARE DEALERS

CAN RECOMMEND THE

CHAMPION METAL WINDOW SASH CHAINS

to their customers as a reliable substitute for Sash Cords, very strong and lasting (some in daily use ten years), and gives thorough satisfaction wherever used. The patented attachments are very simple and can be applied to any window.

MANUFACTURED ONLY BY

"THOMAS MORTON"

65 Elizabeth Street,

Write for Prices.

NEW YORK.

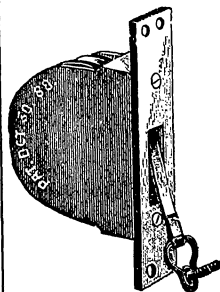
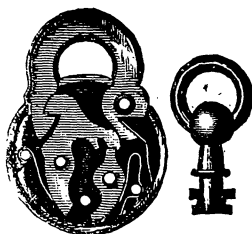
PATENT PERFECTION PADLOCK

Eight Tumblers. Key Turning Both Ways.

Sizes; $\frac{1}{4}$ inch to $2\frac{1}{2}$ inches; of cast bronze. Defies competition for quality and price. No steel or iron used, cannot rust, and cannot be picked. Also, $\frac{1}{4}$ and $\frac{1}{2}$ inch Padlocks, opened with a common pin, in brass and nickel, for cats and small dogs. The best Railroad Switch and Car Lock in the world. Adopted by the United States Treasury for bonded warehouses.

AMES SWORD CO., Chicopee, Mass.

Send for Price Lists and Circulars.



Merit Always Wins.

THE CALDWELL SASH BALANCE

Has been the standard for five years.

Write for our new catalogue of Hardware Specialties.

CALDWELL MFG. CO., Rochester, N. Y.

READING HARDWARE CO., Agents.

81 Reade St., New York.

514 Commerce St., Philadelphia.

73 Wabash Ave., Chicago.

WORLD'S FAIR

visitors are invited to inspect our display of Art Hardware and

"Vassar" Locks

at 73 Wabash Avenue, Chicago.

— Our **"Columbian" Design** —

is shown in the accompanying cut.

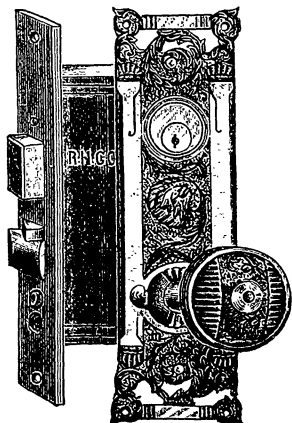
READING HARDWARE COMPANY,

READING, PA.

NEW YORK,

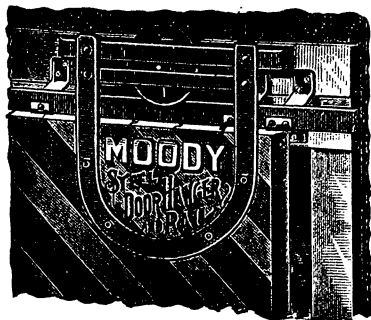
PHILADELPHIA,

CHICAGO.



VICTOR MFG. CO., Newburyport, Mass.

STEEL RAIL.



Showing one-half set of hangers attached to door.



The Only Bracing Bracket Made.

PRICE-LIST.

HANGERS.	Per Doz. pra.
No. 5, to run 6 feet, 3½ in. wheel,	\$10.00
No. 6, to run 10 feet, 4½ in. wheel,	15.00
No. 7, to run 15 feet, 5½ in. wheel,	22.00
RAIL, per foot.....	6½ cents

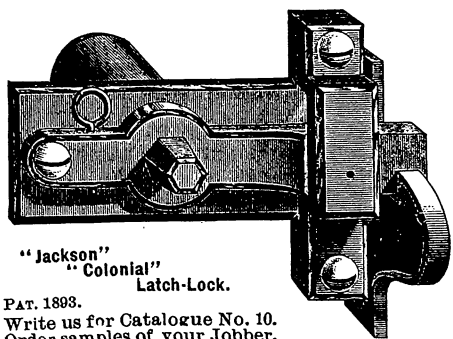
SOLID BRAIDED SASH CORDS, &c.

Picture Wire, Bright Wire Goods, Picture Nails,

Picture Hooks, Knobs, Chain and Wire Brads.

Mason Lines, Chalk Lines, Clothes Lines, Spool Wire,

OSSAWAN MILLS CO., Norwich, Conn.

"Jackson"
"Colonial"
Latch-Lock.

PAT. 1893.

Write us for Catalogue No. 10.

Order samples of your Jobber.

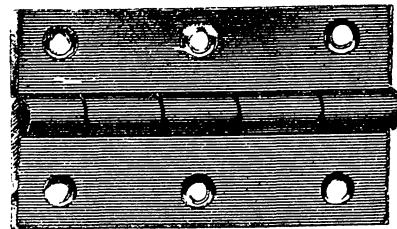
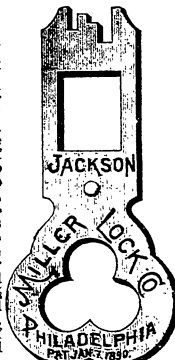
used, permits ¼ inch adjustment as to wood, costs

makes same trim as used on more costly lock.

MILLER LOCK CO., Lock Mfrs, - 4515 Tacony St., Philadelphia.

THE LATCH STRING

The Latch remains of hand-some BRONZE. Operated by KEY from outside, by LIFT from inside. Thrown "OFF" by the PIN under the Latch. Made RIGHT and LEFT HAND, and readily adjustable from one hand to the other. Length of Latch 4 inches. Adapted to all doors that open inward; to GATES, GRILLES, ETC. When made in MASTER KEYED SETS is the cheapest one BURGLAR-PROOF HOTEL LOCK extant. No. 75¼ for ¼ inch wood, 3 plated steel keys, per doz. \$12. No 75 1¾ for 1¾ inch wood, three plated steel keys, per doz. \$12. BRONZE Escutcheon, if extra \$1.50 per dozen, and



Cast Brass Butt Hinges

IN STOCK AND FOR SALE BY

W. & J. TIEBOUT,

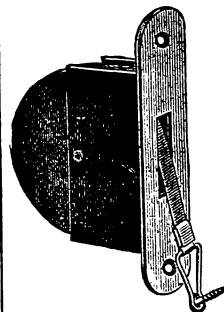
Nos. 16 & 18 Chambers Street, New York.

MANUFACTURERS OF

BRASS, GALVANIZED & SHIP CHANDLERY HARDWARE.

Indispensable in Building

Pullman Steel Frame Sash Balance.



- 1st. Because they require no box frames, and can be used in old as well as new houses.
- 2d. Applied as easily as a common pulley.
- 3d. Cost less money than weights and cord.
- 4th. Last three times as long.
- 5th. Warranted 10 years.

Write us for Catalogue, or any special information and don't get our Balance confused with others of inferior makes.

PULLMAN SASH BALANCE CO., Rochester, N. Y.

New York Office, 142 Chambers St.

Chicago Office, 235 Lake St.

SIMPLEST IN CONSTRUCTION.
EASIEST FITTED.VANDERBILT
SASH
BALANCE
PAT. JULY 5-92
PAT. FEB 14-93Cheapest and Best
Balance Made.

WRITE FOR CATALOGUE.

The Vanderbilt Sash Balance Co.,
CANANDAIGUA, N. Y.

Lamberson's Hardware Price Books

COPYRIGHTED 1885.

LARGE SIZE FOR OFFICE USE.

6x9½ Inches, 500 Pages.

Bound in Leather, Price, \$8.00.

Pocket Edition.

4x7 Inches, 250 Pages.

Bound in Leather, Price, \$4.00.

Sent, post-paid, on receipt of price by

DAVID WILLIAMS, Publisher & Booksetter.

96-102 Reade Street, New York.

Palmer's Common Sense Frame Pulley.



MANUFACTURED BY

PALMER HARDWARE MFG. CO., Troy, N. Y.

WILD'S

TWINE CUTTER.

—Patent Applied for—

Simple and Convenient

Prices on Application.

Manufactured by

A. L. WILD,

252 FRIENDSHIP STREET,
PROVIDENCE, R. I.

COMMON SENSE SASH BALANCE.



The Best and most Practical substitute for weights invented. The most Durable, the Cheapest and best device for all ordinary windows. Balances when in position are out of sight. No rivets, bolts or screws are used in putting it together, so that nothing can get out of order or need repairing. No cutting, boring or marring the sash, as the Balances are let into the jamb.

Manufacturers of Sash Balances, Sash Locks, Sash Lifts, Monitor Sash Irons.

STEWART & BAKER,

107 State Street, Rochester, N. Y.

No more Slamming!
...Doors!

Our Combination

Door Check
Lock and
BumpersHolds
door
in
any
positionFor sale by all Jobbers. Write
for Circulars.

Unity Door Check Co.,

234 Lake St., Chicago, Ill.



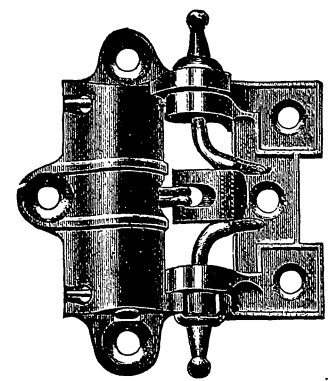


FROST'S ANTI-RATTLE
Pat. Jan. 20, 1880.
Out One-half Size.
Sample pair sent to any hardware or saddlery firm by addressing
The Frost Thill Spring Co.
Boston, Mass.

THE WILCOX & HOWE COMPANY,
BIRMINGHAM, CONN.,
MANUFACTURERS OF
A Full Line of Carriage Hardware
ALSO SPECIAL FORGINGS.

Estimates cheerfully given. Send for Catalogue

NEW IDEA SPRING HINGE



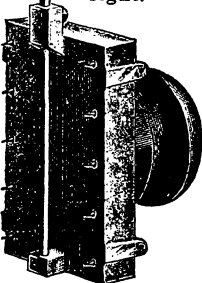
Holds the door strongest when closed.
Resistance gradually decreases in opening
and increases in closing the door.
A covered (patented) hold-back Spring Hinge. Full particulars, free Sample and Prices by mentioning this paper.

STOVER MANUFACTURING CO.,
145 River St., Freeport, Ill.

Grennan's Sash Pulley Marker for Common Sense Sash Pulleys.

Will mark in ten minutes what would take five hours to do the old way, saving the price of it the first time used.

It always marks the centers accurately, so the pulleys are sure to fit and saving a great deal of refitting. They are simple, durable, handy, and sell at sight.



Throop's Sash-Weight Fastener

Saves 2 cents a window in cost of material, saves time in putting on and makes a neater job than tying knots. Send for circulars and prices

J. W. Skelly & Son, - BRISTOL, CT.

P. J. Conroy & Co.,

Paschall, PHILADELPHIA.

"CONROY"
Refrigerator Door
Fasteners

Have rapidly supplanted all others.

Refrigerator Trimmings.

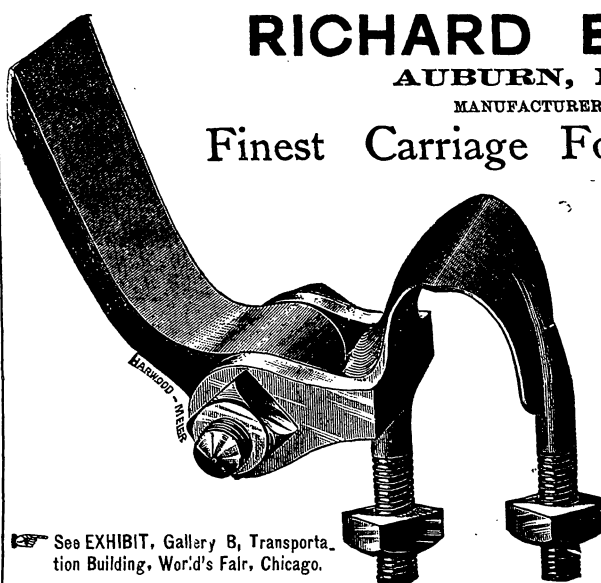


Pat. Dec. 16, '85.



All Tags and Labels on Covert Goods bear the above Trade-Mark, and are sold by all Leading Jobbers in General and Saddlery Hardware at Manufacturers' Prices.

COVERT MFG. CO.,
WEST TROY, N. Y.



RICHARD ECCLES,
AUBURN, N. Y.,
MANUFACTURER OF
Finest Carriage Forgings, Couplings, Clips, King Bolts, Fifth Wheels, &c. Manufacture a full line Special Drop Forgings.

See EXHIBIT, Gallery B, Transportation Building, World's Fair, Chicago.

Send for Catalogue.

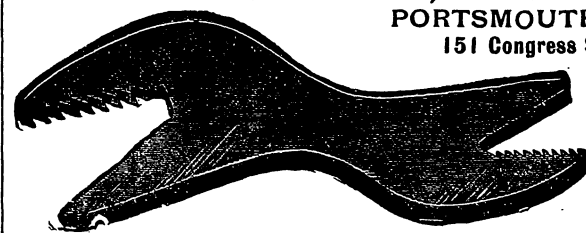
"ALWAYS READY" WRENCH.
FORGED STEEL, NICKEL PLATED.

PORTSMOUTH WRENCH CO.,
151 Congress St., Boston, Mass.

SEND FOR PRICES.

Machinists, Carriage Makers, Blacksmiths, Mechanics, Spinners, Weavers, Carders, and in all Departments of Woolen and Cotton Mills, Farmers, Housekeepers, and in fact everybody that ever uses a wrench

NEEDS THIS ONE.



AMERICAN BOLT COMPANY,

Manufacturers of
BOLTS AND NUTS, COACH OR LAG SCREWS.
Bridge Bolts, Car Bolts, Track Bolts, Washers, Chain Links, BUILDING BOLTS
AND IRONS OF ALL KINDS, Forgings, Bolt and Nut Machinery, &c.

JAMES MINTER, President.

LOWELL, MASS.

MILES F. BRENNAN, Treas.

Motley's Adjustable Sash Holder



Patented Dec. 13, 1892.

For Windows, New or Old, In Buildings, Cars, Steamboats, Carriages, etc. Also for Window Screens and Sliding Blinds. Send for Descriptive Circular.

P. MOTLEY, 750 S. Broad St., Philadelphia, Pa.

THE QUEEN ANNE SCREEN CO.
of Burlington, Vt.

MANUFACTURERS OF

Improved Adjustable Window Screens.

THE QUEEN ANNE. With box panels; the only screen made and finished alike on both sides.
THE EUREKA. The best cheap extension screen on the market.
SCREEN DOORS. Finished all ready to hang. Sticks Corners, Improved Frames, &c.

Write for Circular and Price-List.

THE
Knapp & Cowles Mfg. Co.,

Bridgeport, Conn.,

Makers of a large line of

STANDARD

Hardware Specialties.

SEND FOR
K Catalogue.



Porcelain Lined Lemon Squeezers



Best Common Mouse Traps, Steak Hammers, Boot Jacks, Lap Boards, Beacon Hill Pat. Mouse Traps, Mallets, Bung Starters, Hand Screws.

Ripley Mfg. Co., Unionville, Conn

WHY USE WOODEN OR HEAVY STEEL BLOCKS**WHEN THE STEEL AND IRON
TACKLE BLOCKS**

—MADE BY—

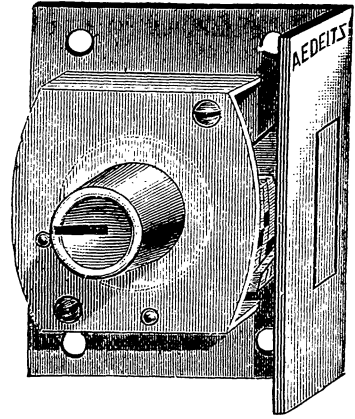
The Cleveland Block Co.

CLEVELAND, OHIO, U. S. A.,

ARE BETTER IN EVERY WAY.

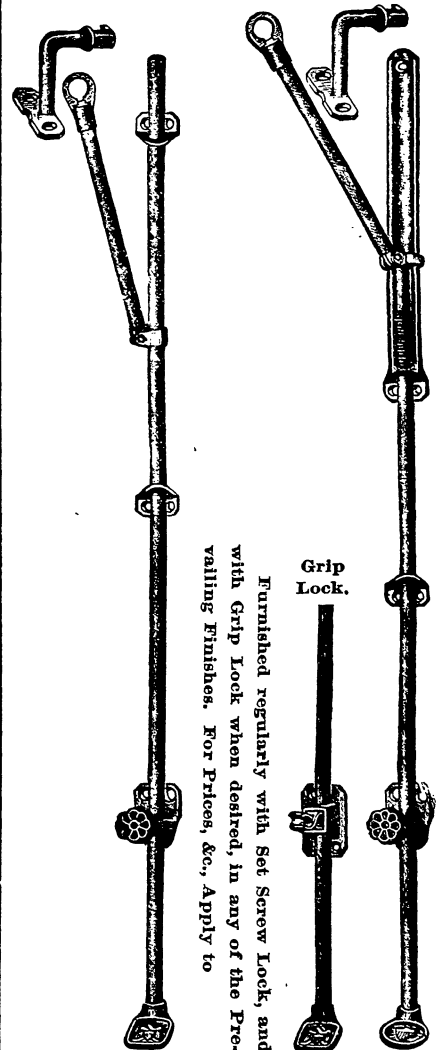
No waste material. Every ounce of weight in the line of strength. No clumsy outside straps or bolts. As light as wooden blocks and vastly more durable. They wear, but never break. Sheaves interchangeable.

General Agents: Topping Brothers, 92 Chambers Street, New York.
The H. Channon Co., 22 Market Street, Chicago.
New England Agents, - Dodge, Haley & Co., 212 High Street, Boston.

A. E. DEITZ**No. 51 Lock.**

J. C. McCARTY & CO., Agents,
97 Chambers and 81 Reade Sts., New York.

Factory, BROOKLYN, E. D., N. Y.

TRANSOMLIFTERS**"EAGLE."****"SHIELD."**

Furnished regularly with Set Screw Lock, and with Grip Lock when desired, in any of the Prevailing Finishes. For Prices, &c., Apply to

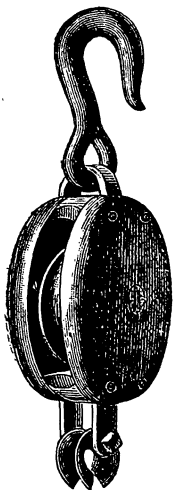
J. F. WOLLENSAK, PATENTEE
CHICAGO, ILLINOIS.

SASH WEIGHTS**E. E. BROWN & CO.,**

McKean and Meadow Sts.,

PHILADELPHIA PA.

STEEL. WOOD OR IRON
—MADE BY—
TOLEDO BLOCK WORKS.
511-513-515 Water St., TOLEDO, OHIO,
WILL PROVE SATISFACTORY
TO USER.



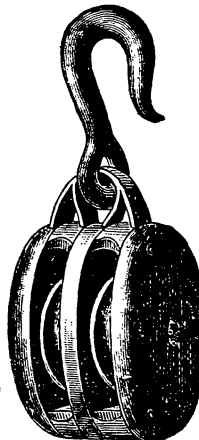
SHUBERT & COTTINGHAM,
MANUFACTURERS OF

**Round Edge Tackle Blocks,**

118 North Delaware Avenue,
Factory, Beach and Norris Sts., PHILADELPHIA

GENERAL AGENTS:
BRITTAN & BOND,

154 Lake St., Chicago, Ill.

**NONPAREIL
Ratchet Wrenches.**

Made of best forged Tool Steel; are easily and readily adjusted and controlled. Can be made reversible instantly without removing from their work by throwing over the lever in slot of the handle.

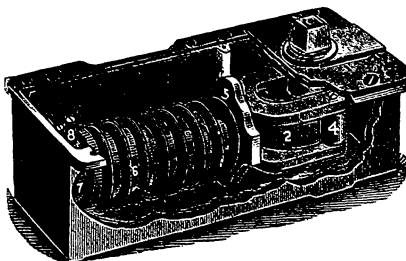
The Set of Combination Tools No. 1 includes the wrench, two sockets, one for screw-driver, bit or reamer shank, with wood handle, and one socket



for drill shank and feed nut. The jaws on this wrench open from 3-16 to 1 1/4 inches.

Send for Illustrated Circular and Price-list of various sizes

The Keystone Mfg. Co.,
312 Terrace, Buffalo, N. Y.

**CHECKING SPRING HINGES
FOR SWING DOORS.**

Applied in floor under door. They close the door gently, without noise or violence and stop it at once at the centre. Doors cannot sag, springs do not break or set.

J. BARDSLEY, 149 & 151 Baxter St., New York.

Illustrated Price-List on Application.

H. D. SMITH & CO.,

Plantsville, Conn.,

MANUFACTURERS OF THE BEST QUALITY

CARRIAGE MAKERS' HARDWARE,

MANUFACTURE THE LARGEST VARIETY OF

FORGED CARRIAGE IRONS

Of Best Material and Workmanship.

Send for Price and Illustrated List of

CHAMPLAIN

Manufactured by the NATIONAL HORSE NAIL CO.,
VERGENNES, VERMONT.

All Sizes. All Patterns. All Warranted. Sold Everywhere.

J. C. McCARTY & CO., Agents. New York.



Elegant Iron.

Beautiful Shape.

HORSE SHOES,
Light, Medium and Heavy.

MULE SHOES,
Light, Medium and Heavy.

Illustrated booklet and prices to all
parts of the world on application.

OLD DOMINION IRON AND NAIL WORKS CO.,

ARTHUR B. CLARKE, President.

Chicago Office, 45 La Salle St.

Richmond, Va., U. S. A.

BIEDER ADJUSTABLE GRASS CATCHER.

FITS ALL MOWERS.

It is cheap, light (weight $1\frac{1}{2}$ lbs.), and sells upon its merits.

WRITE TO YOUR JOBBER OR TO

THE CLEVELAND
NOVELTY CO.,
CLEVELAND, O.,

Manufacturers of

Cloth, Iron and Iron Bottom Grass
Catchers.



P. F. BURKE, C. F. DEWICK & CO.
Successor to
Manufacturer of
PATENT STEEL
(Blunt and Sharp)
TOE-CALKS.
—ALSO—
BURKE'S IMPROVED
HORSESHOERS'
FOOT VICE.
Send for Circulars.
360 Dorchester Av. Die for Welding
BOSTON, MASS. Sharp Calks.

PHOENIX HORSE SHOES.

PHOENIX HORSE SHOE CO.,

Poughkeepsie, N. Y.

NEW YORK OFFICE, No. 66 Reade St.

AXLEINE



is a fine quality of Axle
Grease put up in square
tin boxes containing
one pound; beautifully
decorated in assorted
colors; designed espe-
cially for the Hardware
Trade. Showy and at-
tractive shelf goods.

Send for sample and
prices.

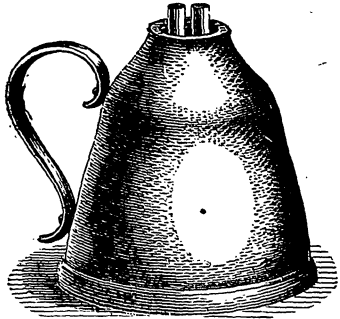
LOVELL, TRACY & CO. 71 Asylum St.,
Hartford, Conn.

BUFFALO SCALE CO., Buffalo, N. Y. SCALES OF ALL KINDS.

PATENTED ARTICLES
OF

Malleable Iron.

Hammer's Malleable Iron Hand Lamps.



SCREW, KEROSENE SIZE.

Hammer's Adjustable Clamps.

Hammer's Malleable Iron Oilers, 3 Sizes

Hammer's M. I. Hanging Lamps.

NEW pattern Heavy Screw Clamp
strongest in the Market.

For sale by all the principal Hardware Dealers.

Send for Price List.

MALLEABLE IRON CASTINGS

Of superior quality, and Hardware Specialties
in Malleable Iron made to order.

HAMMER & CO.,
BRANFORD, CONN.

HOWARD IRON WORKS.

BUFFALO, N. Y.,

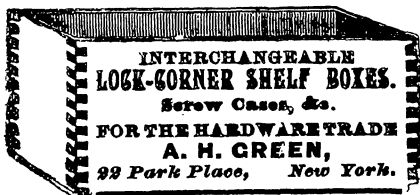
Manufacturers of

BOLT CUTTERS

AND NUT TAPPING MACHINES.

(Schlenker's Patent).

Send for Illustrated Catalogue.



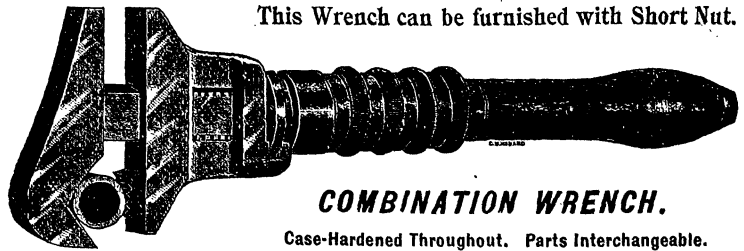
BERGER'S PATENT TRUCKS.

The Handiest, Cheapest and
best in existence.

Highest testimonials from those in
use. Wholesale agents wanted in every
city. Correspondence from Truck Man-
ufacturers solicited. Circulars, price-
lists and full particulars furnished.

BERGER BROS.,

237 Arch St., Philadelphia, Pa



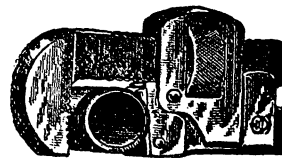
This Wrench can be furnished with Short Nut.

COMBINATION WRENCH.

Case-Hardened Throughout. Parts Interchangeable.

This wrench not only combines the superior qualities of a Gas Pipe Wrench but also all the
requisite combinations of a regular Nut Wrench, thus making a combination which has no equal.
For Circulars and Price-List, address

BEMIS & CALL HARDWARE & TOOL CO., Springfield, Mass., U. S. A.



TRIMO PIPE WRENCH,

Forged Steel.

All parts interchangeable.

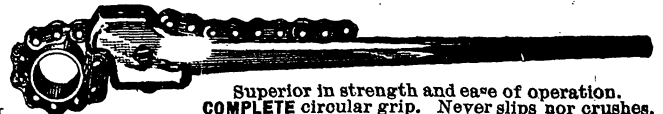
Grips firmly without loss of motion, Releases readily. Never locks, Causes no
trouble in close quarters. Does not crush the pipe.

TRIMO

CHAIN

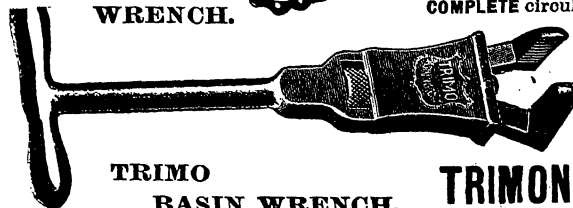
PIPE

WRENCH.



Superior in strength and ease of operation.
COMPLETE circular grip. Never slips nor crushes.

Can be used with one
hand and in closer quarters
than any other Basin
Wrench. Parts interchange-
able.



TRIMO

BASIN WRENCH.

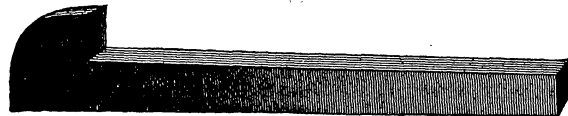
TRIMONT MFG. CO.,

ROXBURY,
MASS.

Drop-Forged Steel Keys.

(Eleven Sizes, 3-16 in. to 1 in. inclusive.)

Furnished to special length if desired.



Send for price-list to

J. H. WILLIAMS & CO., 9-15 Richards St., Brooklyn, N. Y.

Makers of Brock's Patent Chain Pipe Wrench. Standard and Special Drop-
Forgings of every kind.

COMBINATION PLIERS.



Gas Pliers
Wire Cutters
Wrench and
Screw Driver
Combined.

DROP-FORGED FROM BEST TOOL

STEEL AND FINELY FINISHED.

THE BILLINGS & SPENCER CO.,

HARTFORD, CONN.

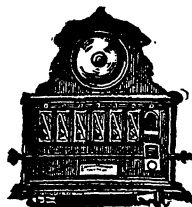
W. R. OSTRANDER & CO.,

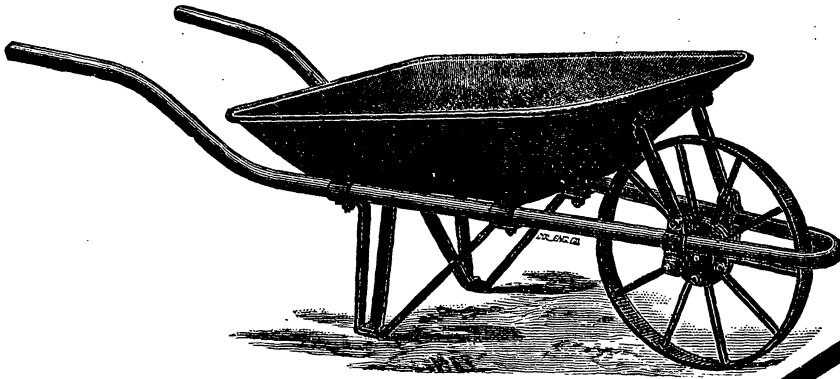
204 FULTON STREET, NEW YORK,

Manufacturers of

SPEAKING TUBES, WHISTLES, ORAL, ELECTRIC
MECHANICAL AND PNEUMATIC ANNUNCIATORS
AND BELLS.

Complete outfits of Speaking Tubes, Whistles
Electric, Mechanical and Pneumatic Bells. A full line
always in stock. Send for new catalogue. Factory,
DeKalb Ave. near Knickerbocker, Brooklyn, N. Y.





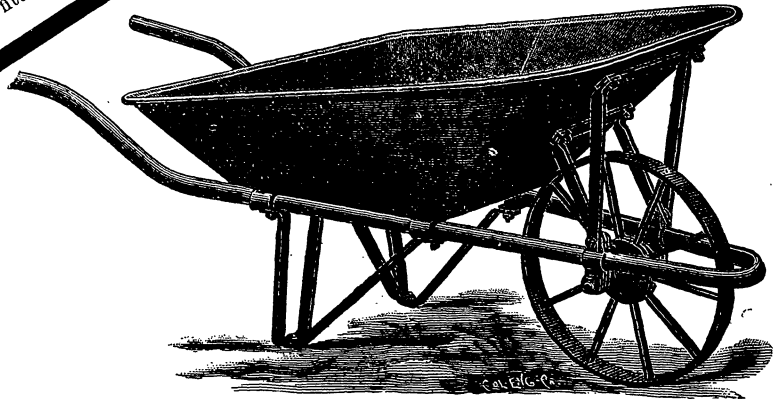
THE

Kilbourne & Jacobs Mfg., Co.,

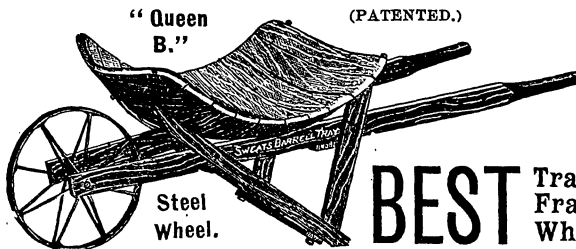
COLUMBUS,
OHIO.

The "Columbus" Tubular Steel Barrows

Embodiment all the advantages of other TUBULAR BARROWS, and in addition a number of special features not found in others. The trays are stamped from one sheet of high carbon steel, the edges of which are turned over a heavy steel rod, giving great strength and rigidity to the tray. The tubular handles are not weakened at any point by having holes punched for attaching the tray and legs. The handle extends around the front of the wheel, forming an additional brace to the barrow, and also for the purpose of dumping forward. All our barrows are fitted with the Jacobs Steel Wheel, outstanding frame and tray. All sizes are made, and our prices as low as is consistent with first-class goods.



"BARREL TRAY" WHEEL BARROWS.



(PATENTED.)

OUR tray is made from Staves strung on Iron Rods. Will not split or break. The best seller and most durable Barrow in the market.

—WRITE FOR PRICES.—

BEST Tray Frame Wheel. SWEATT MFG. CO., Minneapolis, Minn.
J. C. McCARTY & CO., New York, Direct Representatives
G. A. SEAVER, New Orleans, Special Agent.



Boss Sprinkler.

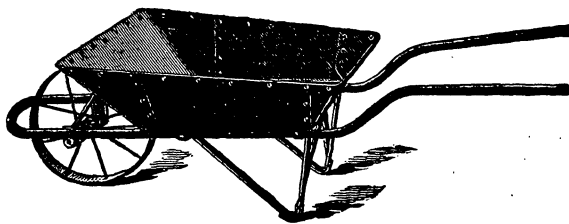
For Potatoes, Tobacco,
Cotton and all small
Plants and Vines.

Has given satisfaction
to all who have
handled it.

Prices and Circulars sent
on application.

OLIVER A. SMITH,
CLARKSTON, MICH.

Akron Tubular Steel Wheelbarrows.



Re-enforced Tray, Strong
and Durable.

Also McNeil's
Patent Balanced
Charging Barrows,
Automatic Dump.

Write us for Prices.

THE AKRON TOOL CO., AKRON, O.

ALL STEEL WHEELBARROWS & SCRAPERS



Write
for
Catalogue

MANUFACTURED BY

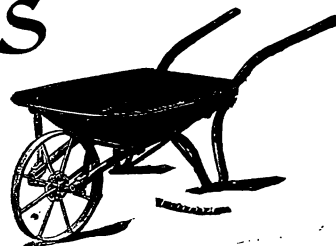
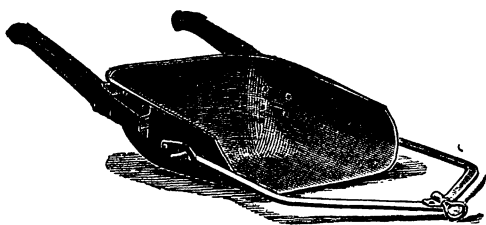
AMERICAN STEEL SCRAPER CO.,
1104 Court St. SIDNEY, O.



BARROWS & SCRAPERS

Made especially for the trade at prices to suit

Good goods possessing merit is our specialty.

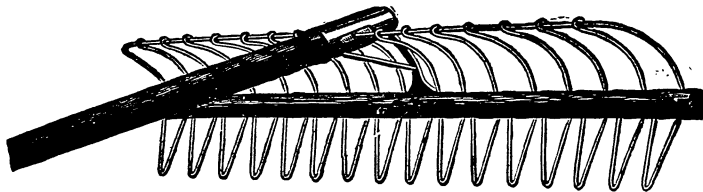


Sidney Steel Scraper Co., 924 Poplar Street,
SIDNEY, O.

LAWN RAKES. The "GEM" AND "DAVIS."

Both good and each the best. If you have not stocked up, better do so at once. Our prices are low.

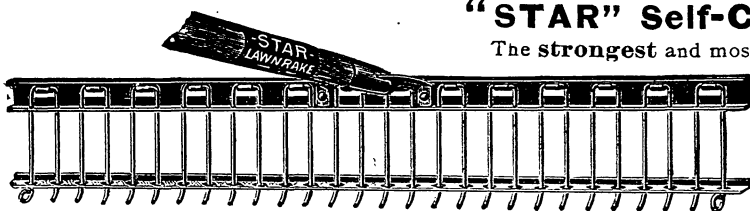
SCHAEFFER & CO., Dayton, O.



"STAR" Self-Cleaning Lawn Rakes. All Steel.

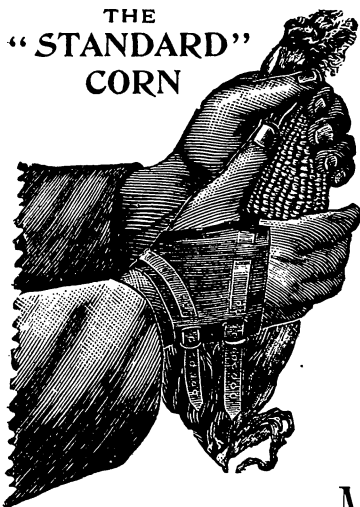
The strongest and most practical rakes in the market. The cleaning bar keeps the teeth free from leaves and grass and the eyes on the end teeth prevent the other teeth from digging in the ground. We also make "STAR" Lawn Rakes as above without the self-cleaning bars and turned up end teeth.

SYRACUSE SPECIALTY MFG. CO., Syracuse, N. Y., U. S. A
SURPLUS, DUNN & ALDER, 97 Chambers St., New York,
DIRECT REPRESENTATIVES.



"STAR" Self-Cleaning Lawn Rake.
Pat. Feb. 21, 1893.

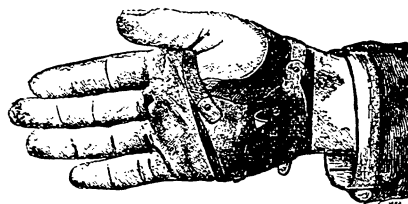
THE
"STANDARD"
CORN



Husker.

A TRIAL WILL CONVINCE

The user that the STANDARD will husk more corn more easily and with greater freedom than any other. It's the only husker that allows of the full use of every joint in the hand and that can be left on the latter while tying fodder.



NO SORE HANDS.

SIX YEARS

of practical use warrant these statements, and as a DEALER you are interested in selling only the best goods to your customers; therefore it will pay you to write for our best discounts.

MOORE & WICKERT, Manfrs., Green Spring
Ohio.



STEEL BARROWS.

LANSING WHEELBARROW CO.
LANSING, MICH.

HOW TO KEEP A STORE

BY S. H. TERRY.

406 PAGES, 5 x 7 1/4 INCHES.
POST-PAID, \$1.50.

Among the subjects discussed are: The selection of a business; choice of a locality; buying a stock of goods; examining, marking and arranging goods; how to advertise; employment of clerks; selling for cash and credit; keeping accounts; expenses; copartnerships; losses by fire, theft, &c.; influences of social life on business; buying at auction; investment of profits; insolvency; business qualifications.

FOR SALE BY

DAVID WILLIAMS, Publisher and Bookseller

96-102 Reade St., New York.

Manufacture To Order
SPECIALTIES & NOVELTIES, PATENTED ARTICLES,
HARDWARE GOODS ETC., SMALL OR FINE MACHINERY.
SEND FOR CATALOGUE. - CORRESPONDENCE SOLICITED
OTTO KONIGSLOW CLEVELAND, O.

PENNSYLVANIA.

INVITATION.

We cordially invite our friends and customers to visit our Exhibit at World's Fair, Chicago, where will be seen the finest and most complete line of Lawn Mowers ever put on the market.

REMEMBER THE LOCATION:

Horticultural Building, North Wing, Section F, Column 73.

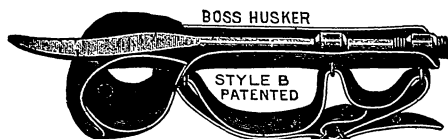
SUPPLEE HARDWARE CO.,
PHILADELPHIA.

New Quaker City

Great American.

CONTINENTAL.

PERKINS "BOSS" HUSKERS



and Hand Protectors.

∴ JOBBING TRADE SOLICITED. ∴

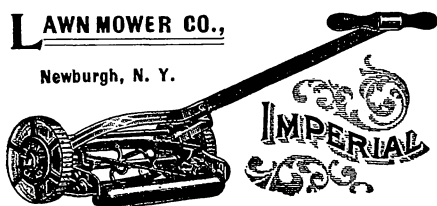
—MANUFACTURED BY—

H. H. PERKINS MFG. CO.,

96 Trade Street, Kewanee, Ill., U. S. A.

COLDWELL
LAWN MOWER CO.,

Newburgh, N. Y.



THE BEST MOWER
ON THE MARKET.

SEND FOR OUR PAPER

"THE LAWN,"

IT IS FULL OF INFORMATION ABOUT LAWNS AND LAWN MOWERS.

The Cockburn Barrow and Machine Co.

OFFICE AND WORKS:

234 to 240 Eleventh St., JERSEY CITY, N. J.
NEW CONCRETE MIXING MACHINES.

Coal and Ash Buckets, Coaling Tubes, Coal and Coke Cars, Patent Tubular Frame Wheelbarrows, Furnace Charging Barrows and Cars, Sheet Iron Work of every description, Patent Power Punching Machines, Every description of General Forgings, Dimpfel Blow Machine Work

F. E. KOHLER & CO.,

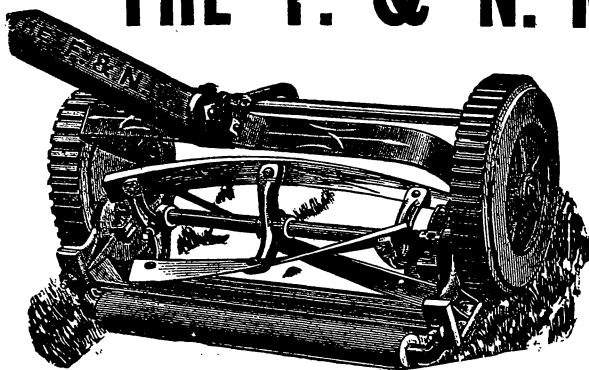
CANTON, OHIO.



HEADQUARTERS FOR

Post Hole Diggers (5 styles). Saw Sets (2 sizes). Steel Spring Curry Combs. Sweat Scrapers. Vegetable Mashers. Can Openers. Lawn Rakes.

THE F. & N. MFG. CO.,



Manufacturers of

Lawn Mowers, Lawn Sweepers and Grass Catchers,
RICHMOND, IND., U.S.A.

The F. & N. High Grade Lawn Mower. Fully Guaranteed.

AGENTS

Woodrough & Hanchett Co.,
Chicago, Ill.
C. F. Guyon Co., Ltd.,
New York.
Woodrough, Mansfield & Co.,
Boston, Mass.

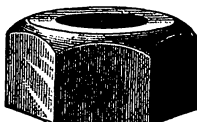
HENLEY'S LAWN MOWERS

First-class high grade machines, made of the best materials. Neat, symmetrical, strong, durable and unexcelled in construction and ease of operation. Does perfect work. For prices address



M. C. HENLEY, Sole Mfr., Richmond, Ind., U. S. A.

SARPENTER & BAYLES, Eastern Agents, 91 Chambers St. & 73 Reade St., New York City.



PORTCHESTER BOLT & NUT CO.

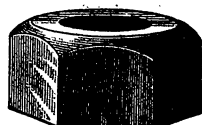
Port Chester N. Y.

MANUFACTURERS OF

BOLTS, NUTS, RIVETS and WASHERS

CHAMFERED AND TRIMMED.

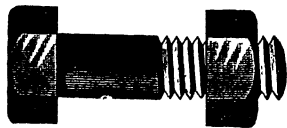
SQUARE AND HEXAGON NUTS A SPECIALTY.



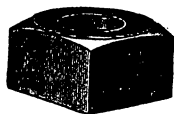


WROUGHT WASHERS

Every Washer.
FLAT
With hole in
TRUE CENTER.



MACHINE BOLTS.



HOT PRESSED NUTS.

Highest
Standard of
EXCELLENCE.

Packed in kegs for general trade, or in 1 and 5 lb. boxes for hardware trade.

It will pay you to correspond with us.

MILTON MANUFACTURING CO.,

MILTON, PA.

THE REX Lawn Mower.

Fully Guaranteed.

The Best Possible Lawn
Mower for the Least
Possible Money.

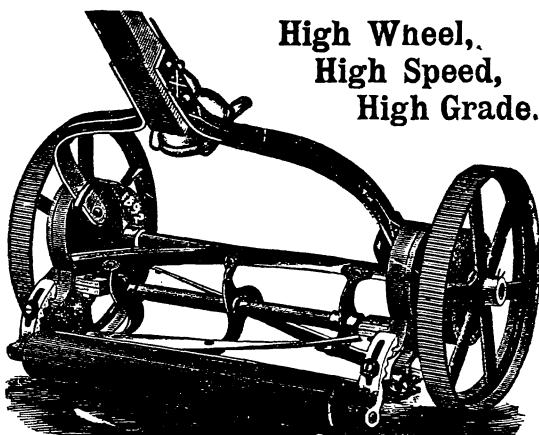
MANUFACTURED BY

W. E. LAPE,

Syracuse, N. Y.

C. E. WOODFUFF,

235 Lake Street, Chicago,
Western Sales Agent.



High Wheel,
High Speed,
High Grade.

HAY KNIVES

SEASON OF 1892-93.

"LIGHTNING"

(Reg. Trade-Mark No. 9583.)

"BLIZZARD"

Reg. Trade-Mark No. 19,390.

It pays to han-
dle FIRST
CLASS
goods.

Write us early
for prices and
terms.



Sole Manufacturers,

The HIRAM HOLT COMPANY
EAST WILTON, MAINE.

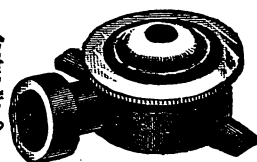


Japanese No. 12, Adjust.

LAWN SPRINKLERS

Cactus No. 9.

We manufacture the BEST and
CHEAPEST Lawn Sprinklers in
the World.

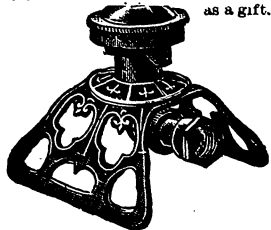


The only Sprinklers which have no revolving parts to leak or wear out.
The only Sprinklers free from small holes, and which cannot become clogged with gritty sub-
stances.

The only Sprinklers which are adjustable and will give a spray as fine as the mist of Niagara, or
as heavy as the area of the supply pipe.

The best Sprinklers for high pressures, and the only sprinklers which will give satisfaction with
low pressures.

We also manufacture the old style revolving sprinklers, but for our own use would not have them
as a gift.

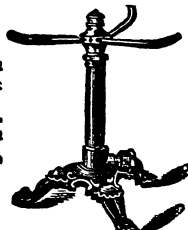


Cactus No. 8.

ETTE & HENGER MFG. CO.

ST. LOUIS MO.

SEND FOR DESCRIPTIVE CIRCULARS.



Patent No. 6.

HALL'S HUSKERS

MADE BY

HALL & ROSS HUSKING GLOVE CO.,

CHICAGO, ILL.,

Are guaranteed to be the Best,
and in Competition sell in pref-
erence to all others.

See that our trade-mark is on
every pin.

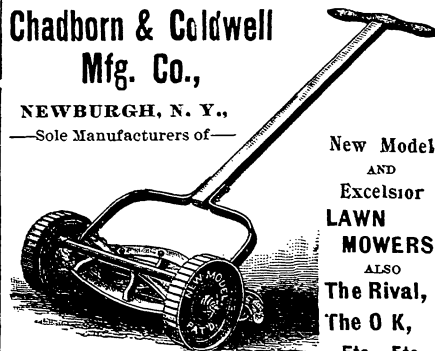


TRADE
MARK

Chadborn & Coldwell Mfg. Co.,

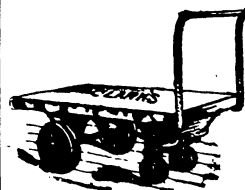
NEWBURGH, N. Y.,

Sole Manufacturers of—



New Model
AND
Excelsior
LAWN
MOWERS,
ALSO
The Rival,
The O K,
Etc., Etc.

Send for Illustrated Catalogue.



TRUCKS of all
kinds Mounted
on rubber or
iron wheels. Trucks
made to order.
Write for prices.
Catalogues free.

G. P. CLARK, Box 0,
Windsor, Locks Conn

Screws and Screw Making With a Chapter on
the Milling Machine; a complete treatise on
Screw Making all its branches, embracing most
recent methods and containing the reports which
originated modern standard screw threads. With
95 illustrations. 12mo, cloth.....\$1.25
For Sale by DAVID WILLIAMS, 96-102 Reade St., N. Y.

WM. H. HASKELL, PRESIDENT.

E. S. MASON, TREASURER.

D. A. HUNT, AGENT.

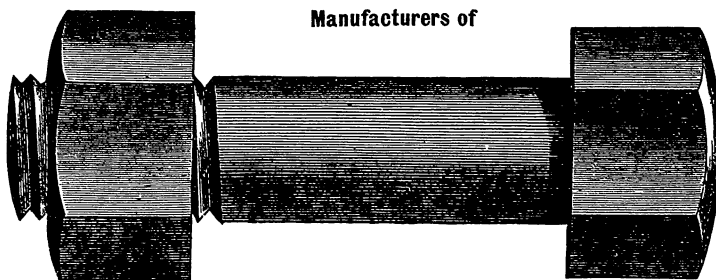
WM. H. HASKELL CO.,
 — MANUFACTURERS OF —
GIMLET POINT COACH SCREWS
Boils, Cold-Punched Nuts and Washers, SUITABLE FOR MACHINERY OF ALL KINDS.

Office and Works: 451 Main St., PAWTUCKET, R. I., U. S. A.

HENRY B. NEWHALL CO., Agents,
 105 CHAMBERS STREET, NEW YORK. - 47 PEARL STREET, BOSTON.

WORCESTER MACHINE SCREW CO., Worcester, Mass.

SET,
CAP AND
MACHINE
SCREWS.



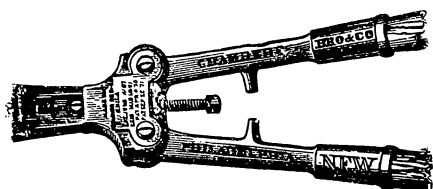
Manufacturers of

STUDS FOR
STEAM
ENGINE,
PUMPS, &c.

EXPANSION BOLTS.



For Fastening all kinds of Structure to Brick and Stone Work.
 Patentee and M'r, **ISAAC CHURCH,**
 Toledo, O.
 Send for Catalogue.



BOLT & RIVET CLIPPERS.

For cutting off the ends of Bolts and Rivets.
 Liberal discounts to the trade.

CHAMBERS BROTHERS COMPANY,
 62d St., BELOW LANCASTER AVE.,
 PHILADELPHIA, PA.

WM. H. JACOBUS,

No. 90 Chambers St., New York.

New York Office of

J. F. Wollensak.
 Barnes Mfg. Co.
 Penn Lock Works.
 Lorenz Bommer.
 Palmer Hdw. Mfg. Co.
 Dibble Mfg. Co.
 Wire Goods Co.
 Garritt & Beach.
 Prindle Mfg. Co.
 Tuck Mfg. Co.
 Henis Vegetable Press.
 Dille & McGuire Mfg. Co.
 National Rivet Works.
 Lufkin Rule Co.
 Wolcott Hdw. Co.
 Zimmerman's Blind Adjusters.
 Burnside Cedar Faucets.
 Fibre Head Mallet.
 Glazier's Patent Hocks

RIVETS
 OF EVERY
 DESCRIPTION, FIRST QUALITY.

W.P. TOWNSEND & CO.
 NEW BRIGHTON, PA.

Labels: ROUND HEAD, FLAT HEAD, STEEP HEAD, COUNTERSUNK HEAD, BELT RIVET, WAGON BOX HEAD, CONE HEAD, ROSE HEAD, TRUSS HEAD.

Weights: 5lb., 6lb., 7lb., 8lb., 10lb., 12lb.

ESTABLISHED 1865.

J. H. Sternbergh & Son,

READING PA.

BOLTS, NUTS, WASHERS, RIVETS,

Including Machine Bolts, Carriage Bolts, Bridge Bolts and Car Bolts,
THE HARVEY PATENT GRIP-THREAD TRACK BOLT, Soft Steel Bolts with Cold Rolled Thread, Bolt Ends, Turnbuckles, Sleeve Nuts, Lag Screws, Set Screws and Tap Bolts and every variety of screwed work,
BOILER, BRIDGE AND SHIP RIVETS, Square and Hexagon Nuts of all kinds and sizes, Plate Washers, Belt Lacing Machines, Rods and Irons for Bridges and Buildings, Merchant Bar Iron, etc., etc.
 Branch Establishment, **THE KANSAS CITY BOLT & NUT CO.**, Kansas City, Mo.

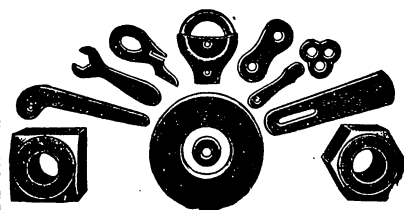
J. FRED WILSON, Worcester, Mass.

Metal Punching and Die Work.

Cold Punched Nuts and Washers
 for all Purposes.

SEND FOR PRICES ON

SPECIALTIES IN LINE OF PRESS WORK.



CLASSIFIED LIST OF ADVERTISERS.

Advertisement Writer.

Duffy, J. A., Hannibal, Mo.

Air Chambers, Copper.

Emory, P. P. Mfg. Co., Springfield, Mass.

Springfield Brass Co., Springfield, Mass.

Air Compressors.

Norwalk Iron Works, S. Norwalk, Conn.

Band Drill Co., 23 Park Place, N. Y.

Air Moving Machinery.

Howard & Morse, 45 Fulton, N. Y.

Aluminum.

Illinois Pure Aluminum Co., Lemont, Ill.

Pittsburgh Reduction Co., Pittsburgh, Pa.

Scovill Mfg. Co., Waterbury, Conn.

Aluminum, Brass and Bronze.

Gaylor, F. L. Co., Ansonia, Conn.

Haight & Clark, Albany, N. Y.

St. Louis Bronze & Aluminum Works, St. Louis, Mo.

Analytical Chemists.

Britton, J. Blodgett, Philadelphia, Pa.

Hunt, Robt. W. & Co., Chicago, Ill.

Moore, Dr. Gideon B., 221 Pearl St., N. Y.

Anti-Friction Metals.—See Babbitt Metal

Anvil and Vise (Combination).

Fulton Iron & Engine Works, Detroit, Mich.

Anvils.

Wright, Peter & Sons, Dudley, Eng.

Appraisers, Auctioneers, &c.

Loring, Chas. Carroll & Co., Boston, Mass.

Arms and Ammunition.

Forehand Arms Co., Worcester, Mass.

Hartley & Graham, 313 & 315 Broadway, New York.

Stevens, J., Arms and Tool Co., Chicopee Falls, Mass.

Union Metallic Cartridge Co., 313 & 315 Broadway, N. Y.

Auctioneers.

Bissell, E. Son & Co., N. Y.

Axes.

Peck, A. G. & Co., Cohoes, N. Y.

Axe Grease.

Lovell, Tracy & Co., Hartford, Conn.

Axles, Springs, &c.—Manufacturers of.

Gautier Steel Dept. of Cambria Iron Co., Johnstown, Pa.

Wurster, F. W. & Co., Brooklyn, N. Y.

Babbitt Metal.

Bridgeport Deoxidized Bronze & Metal Co., Bridgeport, Conn.

Crown Smelting Co., Chester, Pa.

Hertz, T. & Son, St. Louis, Mo.

Keys, W. W. & R. M. Co., Bridgeport, Conn.

Reeves, Paul S., Philadelphia, Pa.

Bakers and Roasters.

Bronson Supply Co., Cleveland, Ohio.

Bale Ties.

Kilmer Mfg. Co., Newburg, N. Y.

Band Saw Machines.

Cross & Speirs Machine Co., Waterbury, Conn.

Band Saws.

Adkins, E. C. & Co., Indianapolis, Ind.

Barb Wire and Fence.

Consolidated Steel & Wire Co., St. Louis, Mo.

Gautier Steel Dept. of Cambria Iron Co., Johnstown, Pa.

Indiana Wire Fence Co., Crawfordsville, Ind.

Kilmer Mfg. Co., Newburg, N. Y.

Lowdow-Saylor Wire Co., St. Louis, Mo.

Washburn & Moen Mfg. Co., Worcester, Mass.

Bar Iron, Manufacturers of.

Atlas-Standard Iron & Steel Co., Bridgeport, Conn.

Allentown Rolling Mill, Allentown, Pa.

Burden Iron Co., Troy, N. Y.

Crescent Forge Shop & Iron Co., Max Meadows, Va.

Montour Iron & Steel Co., Danville, Pa.

Mahoning Valley Iron Co., Youngstown, Ohio.

Sternbergh, J. R. & Son, Reading, Pa.

Barrel Syring.

Leavitt Machine Co., Orange, Mass.

Bellows, Manufacturers of.

Bullock Bellows Co., Cleveland, O.

Scott, Geo. M., Chicago, Ill.

Bells.

Bevin Bros. Mfg. Co., East Hampton, Mass.

Belt Dressing.

Jos. Dixon Crucible Co., Jersey City, N. J.

Belt Fasteners.

Bristols' Mfg. Co., Waterbury, Conn.

Clifton Mfg. Co., Cleveland, Ohio.

Talcott, W. O., Providence, R. I.

Belting, Makers of.

Alexander Bros., 413 N. 3d., Phila.

Jeffrey Mfg. Co., Columbus, O.

Link-Belt Engineering Co., Phila., Pa.

Main Belting Co., Philadelphia, Pa.

N. Y. Belting & Packing Co., Ltd., N. Y.

Roberts Mfg. Co., Pittsburgh, Pa.

Shultz Belting Co., St. Louis, Mo.

Bicycles.

Bingham, W. Co., Cleveland, Ohio.

Coventry Machine Co., Ltd., Boston, Mass.

Freepoint Bicycle Mfg. Co., Freepoint, Ill.

Hulbert Bros. & Co., 26 W. 23d St., N. Y.

Lovell, Jno. P. Arms Co., Boston, Mass.

Parry Mfg. Co., Indianapolis, Ind.

Pope Mfg. Co., Boston, Mass.

Read, Wm. & Sons, Boston, Mass.

Rouse-Durva Cycle Co., Peoria, Ill.

Toledo Bicycle Co., Toledo, O.

Western Wheel Works, Chicago, Ill.

Bits and Braces.

Bridgeport Gun Implement Co., 313 815 Broadway, N. Y.

Blocks, Tackle, Makers of.

Cleveland Block Co., Cleveland, O.

Fulton Iron & Engine Works, Detroit, Mich.

Shubert & Cottingham, Philadelphia, Pa.

Toledo Block Works, Toledo, O.

Blowers.

Buffalo Forge Co., Buffalo, N. Y.

Champion Blower & Forge Co., Lancaster, Pa.

Surtevant, B. F. & Co., Boston, Mass.

Boiler Makers' Rolls.

New Doty Mfg. Co., Janesville, Wis.

Boiler Plates.

Carbon Steel Co., Pittsburgh, Pa.

McIlwain, Wm. & Sons, Reading, Pa.

Lukens Iron & Steel Co., Coatesville, O.

Pottstown Iron Co., Pottstown, Pa.

Boilers, Copper.

Randolph & Clowes, Waterbury, Conn.

Boilers, Steam.

Babcock & Wilcox Co., 80 Cortlandt, Edge Moor Iron Co., Wilmington.

Phoenix Iron Works Co., Meadville, Pa.

Pollock, W. B. & Co., Youngstown, O.

Southwark Fdry. & Mch. Co., Phila., Pa.

Wetherill, Robt. & Co., Chester, Pa.

Bolt Cutters.

Chambers Bros. Co., Philadelphia.

Howard Iron Works, Buffalo, N. Y.

Wells Bros. Co., Greenfield, Mass.

Wiley & Russell Mfg. Co., Greenfield, Mass.

Books.

Lamberson, B., Portland, Ore.

Marine Review, Cleveland, O.

Williams, David, 96-102 Reade, N. Y.

Wolcott & West, Syracuse, N. Y.

Box Bander.

Goodell, J. W., Burlington, Vt.

Boxes, Hdw. Shell, &c.

Green, A. H., 22 Park Place, N. Y.

Jones, Jesse & Co., Philadelphia, Pa.

Box Straps and Corners.

Buffalo Specialty Mfg. Co., Buffalo, N. Y.

Brake Shoes.

Sargent Co., Chicago, Ill.

Brass, Manufacturers of.

Ansonia Brass & Copper Co., N. Y.

Davol, John & Sons, 100 John, N. Y.

Holmes, Booth & Haydens, N. Y.

Plume & Atwood Mfg. Co., N. Y.

Randolph & Clowes, Waterbury, Conn.

Scovill Mfg. Co., Waterbury, Conn.

Waterbury Brass Co., 236 E'way, N. Y.

Brass Butt Hinges.

Tiebout, W. & J., 16 & 18 Chambers'

Brass Foundries.

Best, Fox & Co., Pittsburgh, Pa.

Bridgeport Deoxidized Bronze & Metal Co., Bridgeport, Conn.

Cramp, Wm. & Sons, S & E. B. Co., Philadelphia, Pa.

Emory, P. P. Mfg. Co., Springfield, Mass.

Haight & Clark, Albany, N. Y.

Keys, W. W. & R. M. Co., Bridgeport, Conn.

North Bros. Mfg. Co., Phila., Pa.

Reeves, Paul S., Philadelphia.

Brass Goods.

Brass Goods Mfg. Co., 83 Chambers,

Bridge Builders.

Berlin Iron Bridge Co., East Berlin, Ct.

Boston Bridge Works, Boston, Mass.

Wrought Iron Bridge Co., Canton, O.

Bronze (Tobin).

Ansonia Brass & Copper Co., 19-26 Cliff Street, N. Y.

Builders' Hardware.

Deitz, A. E., 97 Chambers St., N. Y.

Reading Hdw. Co., Reading, Pa.

Yale & Towne Mfg. Co., Stamford, Ct.

Butcher and Shee Knives, Manufacturers of.

Chatillon, John & Sons, 85-89 Cliff St., N. Y.

Goodell Co., Antrim, N. H.

Wilson, John, Sheffield, England.

Butts and Hinges.

McKinney Mfg. Co., Alleghany, Pa.

Sabin Machine Co., Montpelier, Vt.

Stanley Works, New Britain, Conn.

Tiebout, W. & J., 16 Chambers, N. Y.

Calipers and Dividers.

J. Stevens Arms and Tool Co., Chicopee Falls, Mass.

Starrett, L. S., Athol, Mass.

Can Makers' Tools and Machines.

Niagara Stamping and Tool Co., Buffalo, N. Y.

Car Axles.

Roberts, A. & P. & Co., Phila.

Carboy Stands.

Allebrand & Wolf, Philadelphia, Pa.

Car Wheels.

Whitney, A. & Sons, Phila.

Carriage Hardware, Makers of.

Cover's Saddlery Works, Farmer, N. Y.

Ecclies, Richard, Auburn, N. Y.

Scranton Forging Co., Scranton, Pa.

Smith, H. D. & Co., Plantsville, Conn.

Wilcox & Howe Co., Birmingham, Conn.

Cartridge Reloading Tools.

Ideal Mfg. Co., New Haven, Conn.

Casters, Wheel, &c.

Clark, G. P., Windsor Locks, Conn.

Castings, Iron and Steel.

Ames Sword Co., Chicopee, Mass.

Arcade Malleable Iron Co., Worcester, Mass.

Aschman Steel Casting Co., Thurlow, Pa.

Booth, The Lloyd Co., Youngstown, O.

Burgess & Loxley, Buffalo, N. Y.

The Burr & Houston Co., Brooklyn, N. Y.

Cambria Steel-Cambria Iron Co., Johnstown, Pa.

Cheney, S. & Son, Manlius, N. Y.

Chester Steel Casting Co., Phila.

Chrome Steel Works, Brooklyn, N. Y.

Dayton Malleable Iron Co., Dayton, O.

Etze & Henger Mfg. Co., St. Louis, Mo.

Eureka Cast Steel Co., Chester, Pa.

Flagg, Stanley G. & Co., Phila.

Garland Foundry Co., Cleveland, O.

Haight & Clark, Albany, N. Y.

Hammer & Co., Branford, Conn.

Herrick, J. A., 284 Pearl St., N. Y.

Johnson Foundry Co., Johnstown, Pa.

Johnson, I. G. & Co., Spuyten Duyvil, N. Y.

Mahoning Fdry. & Mch. Co., Danville, Pa.

Northwest Malleable Iron Co., Milwaukee, Wis.

Palmer & De Mooy, Cleveland, O.

Passaic Art Casting Co., Passaic, N. J.

Penna. Diamond Drill & Mfg. Co., Birdsboro, Pa.

Sargent Co., Chicago, Ill.

Seasons Foundry Co., Bristol, Conn.

Spencer, I. S., Sons, Guilford, Conn.

Standard Fdry. & Mfg. Co., Cleveland, O.

Standard Steel Casting Co., Thurlow, Pa.

Taylor Iron & Steel Co., High Bridge, N. J.

Totten & Hogg Iron & Steel Fdry Co., Pittsburgh, Pa.

Trenton Mal. Iron Co., Trenton, N. J.

Union Mfg. Co., 103 Chambers St., N. Y.

West Cossackie Iron Fdry. Cossackie, N. Y.

Wetherill, Robt. & Co., Chester, Pa.

Wrenn, Whitehurst & Co., Norfolk, Va.

Chains.

Bradley & Co., Philadelphia.

Bridgeport Chain Co., Bridgeport, Conn.

Link-Belt Engineering Co., Phila., Pa.

Drop Presses.

Bliss, R. W. Co., Brooklyn, N. Y.
Crosby, G. A. & Co., Chicago, Ill.
Miner & Peck Mfg. Co., New Haven, Conn.
Stiles & Parker Press Co., Brooklyn, N. Y.
Vulcan Iron Works, Chicago, Ill.
Waterbury Barrel Foundry and Machine Co., Waterbury, Conn.

Dumb Waiters.

Storm Mfg. Co., Newark, N. J.

Dust Beaters.

Peabody & Parks, Troy, N. Y.

Dynamite.

New York Powder Co., 63 Liberty St., N. Y.

Dynamics.

O. & C. Electric Motor Co., 402 and 404 Greenwich St., N. Y.
Lovell Mfg. Co., Ltd., Erie, Pa.
Zucker & Levett Chemical Co., 10 & 14 Grand St., N. Y.

Edge Tools. Makers of.

Suck Bros., Millbury, Mass.
Butcher, W. & S., 135 Duane St., N. Y.
Buffalo Edge Tool Wks., Buffalo, N. Y.
Plumb, Fayette R., Philadelphia, Pa.
White, L. & I. J. Co., Buffalo, N. Y.

Egg Beaters.

North Bros. Mfg. Co., Philadelphia, Pa.

Electric Bells and Supplies.

Ostrander, W. R. & Co., 204 Fulton St., New York
Wollensak, J. F., Chicago, Ill.

Electric Welding.

Thomson Electric Welding Co., Boston, Mass.

Electro-Platers.

Boardman, L. & Son, East Haddam Ct.

Elevators. Makers of.

Link-Belt Engineering Co., Phila., Pa.
Moline Elevator Co., Moline, Ill.
Morse, Williams & Co., Phila., Pa.
Salem Dry & Mch. Co., Salem, Mass.

Emery and Emery Wheels.

Bell, Geo. E., 36 John St., N. Y.
Grant Corundum Wheel Mfg. Co., Worcester, Mass.
N. Y. Belting & Packing Co., Ltd., N. Y.
Northampton Emery Wheel Co., Leeds, Mass.
Norton Emery Wheel Co., Worcester, Mass.
Springfield Emery Wheel Mfg. Co., Bridgeport, Conn.
Sterling Emery Wheel Co., 174 Fulton St., New York.

Enamels.

Nubian Iron Enamel Co., Cragin, Ill.

Engineers and Contractors.

Aiken Henry, Pittsburgh, Pa.
Artificial Gas Engineering Co., Pittsburgh, Pa.
Carten, Henry J., Pittsburgh, Pa.
Herrick, J., 284 Pearl St., N. Y.
Kennedy, Julian, Pittsburgh, Pa.
Laughlin, Alex. & Co., Pittsburgh, Pa.
Lean, D. R. Co., Pittsburgh, Pa.
McClure, Amos & Co., Pittsburgh, Pa.
Pittsburgh Iron & Steel Engineering Co., Pittsburgh, Pa.
Roberts, Frank C., Philadelphia, Pa.
Smythe, S. R. Co., Incorporated Pittsburgh, Pa.
Swindell W. & Bros., Pittsburgh, Pa.
Winkie, Bothwell & Co., Ltd., Pittsburgh, Pa.
Witherow, Jas. P. Co., Pittsburgh, Pa.

Engines. Gas.

Otto Gas Engine Works, Phila., Pa.
Rollason Gas Engine, Havemayer Bldg., N. Y.

Engines. Steam. Makers of.

Bass Foundry & Machine Works, Ft. Wayne, Ind.
Buckeye Engine Co., Salem, O.
Erie Engine Works, Erie, Pa.
Lefell W. C. Co., Springfield, O.
Norwalk Iron Works Co., So. Norwalk, Conn.
Phila. Engineering Works, Phila., Pa.
Phoenix Iron Wks. Co., Meadville, Pa.
Shipman Engine Co., Boston, Mass.
Southwest Foundry and Machine Co., Phila., Pa.
Tod, William & Co., Youngstown, O.
Wetherill, Robt. & Co., Chester, Pa.

Exhaust Tumblers.

Sweeter, W. A., Brookton, Mass.

Expansion Bolts.

Boone, W. C. Mfg. Co., Boonton, N. J.
Church, Isaac, Toledo, O.

Faucets, Self-Measuring.

Lane Bros., Poughkeepsie, N. Y.

Faucets. Wooden. Makers of.

Boston & Lockport Block Co., Boston, Mass., and Lockport, N. Y.
John Sommer's Son, Newark, N. J.

Feed-Water Heaters.

Davis, I. B. & Son, Hartford, Conn.
Goubert Mfg. Co., 32 Cortlandt St., N. Y.
National Pipe Bending Co., New Haven, Conn.
Webster, Warren & Co., Phila., Pa.
Whitlock Coil Pipe Co., Elmwood, Conn.

Fencing. Iron and Wire.

Sarnum, E. T., Detroit, Mich.
Champion Iron Co., Kenton, O.
Clinton Wire Cloth Co., Clinton, Mass.
DeKalb Fence Co., DeKalb, Ill.
Gilbert & Bennett Mfg. Co., 42 Cliff St., Hartman Mfg. Co., Beaver Falls, Pa.
Kilmer Mfg. Co., Newburgh, N. Y.

Mast, Ross & Co., Springfield, O.
The Van Dorn Iron Works Co., Cleveland, O.

Beliance Wire & Iron Wks., Milwaukee, Wis.

Files, Importers of.

Moss, F. W., 80 John, N. Y.

Files and Rasps. Manufacturers of.

Banker & White, Troy, N. Y.
Barnett, G. & H., 41 & 43 Richmond Phila.
Butcher, W. & S., 135 Duane St., N. Y.
McCauley File Co., Philadelphia.
Nicholson File Co., Providence, R. I.

Fire Brick. Makers of.

Borgner, Cyrus, Philadelphia, Pa.
Gardner, Jas. & Son, Cumberland, Md.
Treischer P. & Sons, foot St. Houston, St.
McLeod & Henry Co., Troy, N. Y.
Maurer, H. & Son, 420 E. 23d, N. Y.
Ostrander Fire Brick Co., Troy, N. Y.
Valentine, M. D. & Bro., Woodbridge.

Fire Sets.

Troy Nickel Works, Troy, N. Y.

Fishing Tackle.

Dame, Stoddard & Kendall, Boston, Mass.

Flint and Emery Paper.

Baeder, Adamson & Co., Phila., Pa.

Flue Cleaners.

Mackey, Jas. T. St. Louis, Mo.

Fly Fans.

Matthai, Ingram & Co., Baltimore, Md.

Fodder Cutters.

Silver Mfg. Co., Salem, O.

Forges, Portable. & Co.

Bradley & Co., Syracuse, N. Y.
Bullock Bellows Co., Cleveland, O.
Buffalo Forge Co., Buffalo, N. Y.
Champion Blower & Forge Co., Lancaster, Pa.
Empire Portable Forge Co., Lansingburg, N. Y.
Sturtevant, B. F. Co., Boston, Mass.

Forgings, Iron and Steel.

Bethlehem Iron Co., S. Bethlehem, Pa.
Cambria Steel-Cambria Iron Co., Johnstown, Pa.
Scranton Forging Co., Scranton, Pa.

Foundry Findings.

Chicago Fdy. Supply Co., Chicago, Ill.
MacKellar Foundry Facing & Supply Co., Quincy, Ill.
Paxson, J. W. & Co., Phila.
S. Obermayer Co., Cincinnati, O.
Smith, J. D. Fdy. Supply Co., Cin., O.

Foundry Riddles.

Estey, W. S. 65 Fulton, N. Y.

Foundry Supplies.

Chicago Fdy. Supply Co., Chicago, Ill.
Colliau, Victor, Detroit, Mich.
MacKellar Fdy. Facing & Supply Co., Quincy, Ill.
S. Obermayer Co., Cincinnati, O.
Paxson, J. W. & Co., Philadelphia.
Smith, J. D. Fdy. Supply Co., Cin., O.

Friction Clutches.

Keystone Clutch & Mch. Wks., Phila., Pa.
Moore & White Co., Philadelphia, Pa.

Fruit Presses.

Enterprise Mfg. Co., Philadelphia, Pa.

Garden Tools.

Noyes, B. B. & Co., Greenfield, Mass.

Gas Producers.

Wood, R. D. & Co., Philadelphia, Pa.

Gas & Steam Fitters' Supplies.

Pancoast, Henry B. & Co., Phila., Pa.

Gauge, Rolling Mill.

Haines Gauge Co., Philadelphia, Pa.

Gear Cutters.

D. E. Whiton Mach. Co., New London, Conn.

Gears.

Boston Gear Works, Boston, Mass.
Gleason Tool Co., Rochester, N. Y.
New Process Raw Hide Co., Syracuse, N. Y.
Poole, Robt. & Son Co., Baltimore, Md.
Union Fdy. & Mch. Co., Pittsburgh, Pa.

Glass Tubes.

Ashcroft Mfg. Co., 111 Liberty St., N. Y.

Glass Cutters.

Monce, S. G., Bristol, Conn.

Glue.

Baeder, Adamson & Co., Phila., Pa.
Russia Cement Co., Gloucester, Mass.

Grass Catchers.

Cleveland Novelty Co., Cleveland, O.
Supplier Hardware Co., Phila., Pa.

Grinding and Polishing Machines.
Norton Emery Wheel Co., Worcester, Mass.
Washburn Shops, Worcester, Mass.

Grindstone Dressing Machinery.
Blake & Johnson, Waterbury, Conn.

Grindstones.

Cleveland Stone Co., Cleveland, O.
Huron Grindstone Co., Port Austin, Mich.

Gunpowder. Makers of.

Lafin & Rand Powder Co., 29 Murray St., N. Y.

Hand Carts.

Lansing Wheelbarrow Co., Lansing, Mich.

Halter Chains.

Kelle & Woolworth, Niagara Falls, N. Y.

Handles.

New Process Raw Hide Co., Syracuse, N. Y.
New York Mallet and Handle Wks., 456 E. Houston St., N. Y.

Hangers. Door.

Lane Bros., Poughkeepsie, N. Y.
Victor Mfg. Co., Newburyport, Mass.

Hardware Comm'n Merchants.

Doscher, Martin, 38 Chambers, N. Y.
Field, Alfred & Co., 93 Chambers St., N. Y.
Graham, John H. & Co., 111 Chambers St., New York.
Jacobus, W. H., 90 Chambers, N. Y.

Hardware Manufacturers.

Richards, E. S., Bridgeport, Conn.
Stearns, E. C. & Co., Syracuse, N. Y.
Union Mfg. Co., 103 Chambers, N. Y.
Yale & Towne Mfg. Co., Stamford, Conn.
Bingham, W. Co., Cleveland, O.
Graham, John H. & Co., 113 Chambers, N. Y.
Hussey, E. J. & Co., 80 John St., N. Y.
McCoy, Jos. E. Co., 26 Warren St., N. Y.
Stokes, Sweet & Lyon, 35 Barclay, N. Y.
Underhill, Clinch & Co., 94 Chambers St., N. Y.

Hardware Specialties.

Acme Shear Co., Bridgeport, Conn.
Belden Machine Co., New Haven, Conn.
Empire Portable Forge Co., Lansingburg, N. Y.
Enterprise Mfg. Co., Philadelphia, Pa.
Erie & Henger Mfg. Co., St. Louis, Mo.
Haines & Zimmerman, Phila., Pa.
Hart, H. C. Mfg. Co., Detroit, Mich.
Henn, A. S. & Co., New Haven, Conn.
Knapp & Cowles Mfg. Co., Bridgeport, Conn.
Lanz Mfg. Co., Racine, Wis.
North Bros. Mfg. Co., Philadelphia, Pa.
Peabody & Parks, Troy, N. Y.
Shepard, Sidney Co., Buffalo, N. Y.
Welland, Chas., 113 Chambers St., N. Y.
Wilson, J. Fred, Worcester, Mass.
Wire Goods Co., Worcester, Mass.
Underhill, Clinch & Co., 94 Chambers Street, N. Y.

Hardware, Yacht and Ship.

Ferdinand, L. W. & Co., Boston, Mass.

Harness Snaps.

Cort, M. G. Co., West Troy, N. Y.
Coverly Saddle Wks., Farmer, N. Y.
Fitch, W. & E. T., New Haven, Conn.

Hay Knives.

Holt, Hiram, Co., E. Wilton, Me.

Holisting Machines.

Box, Alfred & Co., 314 Green, Phila.
Jrow - Holisting & Conveying Mch. Co., Cleveland, Ohio.
Copeland & Bacon, 85 Liberty St., N. Y.
Fulton Iron & Engine Wks., Detroit, Mich.
Harrington, E. Son & Co., Phila.
Lane Bros., Poughkeepsie, N. Y.
Lidgerwood Mfg. Co., 96 Liberty, N. Y.
Mair & Beekley, Philadelphia.
Moore Mfg. & Fdy. Co., Milwaukee, Wis.
Morse, Williams & Co., Phila.
Sellers, Wm. & Co., Phila. and N. Y.
Speidel, J. G., Reading, Pa.
Yale & Towne Mfg. Co., Stamford, Ct.

Hollow-Ware.

Farley Supply Co., Cleveland, Ohio.
Cleveland Stamping & Tool Co., Cleveland, O.
Stuart & Peterson Co., Phila., Pa.

Holloware, Aluminum.

Illinois Pure Aluminum Co., Lemont, Ill.

Horse and Barbers' Clippers.

Hothkiss, E. S., Bridgeport, Conn.

Horse Nails. Makers of.

National Horse Nail Co., Vergennes, Vt.

Horse Shoes. Makers of.

Bryden Horse Shoe Co., Catsanqua, Pa.
Burden Iron Co., Troy, N. Y.
Crescent Horse Shoe & Iron Co., Max Meadows, Va.
Diamond State Iron Co., Wilmington, Del.
Old Dominion Iron & Nail Works Co., Richmond, Va.
Phoenix Horse Shoe Co., Poughkeepsie, N. Y.
Rhode Island Perkins Horse Shoe Co., Providence.
Standard Horse Shoe Co., Boston, Mass.

Hose.

Cleveland Rubber Co., Cleveland, O.
N. Y. Belting & Packing Co., Ltd., 15 Park Row, N. Y.

Hose Menders.

Hudson, C. E. & Co., Leominster, Mass.

Hotels.

The Audubon, Chicago, Ill.

Hydrants, & Co.

McLean, John, 296 & 298 Monroe, N. Y.

Hydraulic Jacks.

Dudgeon, Richard, 24 Columbia, N. Y.

Watson & Stillman, 204 E. 43d, N. Y.

Ice Breakers.

Wharton, J. S. L., Philadelphia, Pa.

Ice-Cream Freezers.

North Bros. Mfg. Co., Phila., Pa.
Packer, C. W., Philadelphia, Pa.
White Mountain Freezer Co., Nashua, N. H.

Ice Shavers.

Enterprise Mfg. Co., Philadelphia, Pa.

Injectors.

Jenkins Bros., New York

Insurance. Boiler.

Hartford Steam Boiler Inspection & Insurance Co., Hartford, Conn.

Iron and Steel, Swedish.

Lundberg, Gustaf, Boston, Mass.
Milne, A. & Co., 1 Broadway, N. Y.

Iron Commission Brokers.

Corning, Edw. & Co., 30 B'way, N. Y.
Cotton, Bradley & Co., Philadelphia.
Etting, Edw. J., Philadelphia.
Hogan, John L. & Co., Philadelphia, Pa.
Hoffman, J. W. & Co., Philadelphia.
Levis, Henry & Co., Philadelphia.
Kearley, J. H. & Co., Philadelphia.
Lee, J. T. & Co., Philadelphia.
Mohr, J. J., 480 Walnut, Philadelphia.
Mann, E. H. & Co., Philadelphia.
Pilling & Crane, Philadelphia, Pa.
Sibell, Geo. H. & Co., Chicago, Ill.
Wister, L. & R. Co., Phila., Pa.

Iron Ore.

Naylor & Co., 45 Wall, N. Y.
Pickands, Brown & Co., Chicago, Ill.
Pullman, J. Wesley, Phila., Pa.
Samuel, Frank, Philadelphia, Pa.

Iron. Merchants.

Barnes, O. K. & Co., Philadelphia, Pa.
Borden & Lovell, 70 West, N. Y.
Bussenius & Cunliffe, Philadelphia.
Corning Edw. & Co., 29 B'way, N. Y.
Cox, Justice, Jr., Philadelphia.
Cotton, Bradley & Co., Philadelphia.
Hoffman, J. W. & Co., Philadelphia.
Leonard, J., 446 West St., N. Y.
Navor & Co., 45 Wall St., N. Y.
Nicolls, Wheeler & Co., Philadelphia.
Ogden & Wallace, 85 Elm St., N. Y.
Pickands, Brown & Co., Chicago, Ill.
Pierson & Co., 29 Broadway, N. Y.
Richards, D. W. & Co., 88 Nassau St., N. Y.
Thomas, W. H. & Co., Phila., Pa.
Wallace, Wm. B. & Co., Albany & Washington streets, N. Y.
Whitney, A. R. & Co., 17 B'way, N. Y.
Wilson, E. H. & Co., Philadelphia.

Iron. Importers.

Abbott, Jere & Co., N. Y. and Boston.
Lundberg, Gustaf, Boston, Mass.

Iron. Sheet. Manufacturers of.

Cambridge Iron & Steel Co., Cambridge, Ohio.
W. Dewees Wood Co., Lim., McKeesport, Pa.

Ironwork. Ornamental.

Barnum, E. T., Detroit, Mich.
Champion Iron Co., Kenton, O.
Ludlow-Saylor Wire Co., St. Louis, Mo.
Mast, Ross & Co., Springfield, O.
The Van Dorn Iron Works Co., Cleveland, O.

Keys.

Wollensak, J. F., Chicago, Ill.

Kraut Cutters.

Tucker & Dorsey Mfg. Co., Indianapolis, Ind.

Ladders.

Davies, Chas. & Co., Williamsport, Pa.

Ladies.

Detroit Fdy. Equipment Co., Detroit, Mich.

Lamp Stoves.

Glazier Stove Co., Chelsea, Mich.

Lanterns.

Dietz R. E. Co., 60 Light St., N. Y.
Ohio Lantern Co., Tiffin, Ohio.
Steam Gauge & Lantern Co., Syracuse, N. Y.

Lathes.

Draper Machine Tool Co., Worcester, Mass.
Johnson, Israel H., Jr., & Co., Philadelphia, Pa.
Seneca Falls Mfg. Co., Seneca Falls, N. Y.

Lathing. Wire.

Clinton Wire Cloth Co., Clinton, Mass.
N. J. Wire Cloth Co., Trenton, N. J.
Wright & Colton Wire Cloth Co., Worcester, Mass.

Laundry Machines.

The Lang Mfg. Co., Racine, Wis.

Lawn Mowers.

Chadborn & Coldwell Mfg. Co., Newburgh, N. Y.
Coldwell Lawn Mower Co., Newburgh, N. Y.
F. & N. Mfg. Co., Richmond, Ind.
Henley, M. C., Richmond, Ind.
Lape, W. E., Syracuse, N. Y.
Mast, Ross & Co., Springfield, O.
Stearns, E. C. & Co., Syracuse, N. Y.
Supplier Hdw. Co., Phila., Pa.

Lawn Rakes.

Schaeffer & Co., Dayton, Ohio.
Syracuse Specialty Mfg. Co., Syracuse, N. Y.

Lawn Sprinklers.

Erie & Henger Mfg. Co., St. Louis.
McGowan, John H. Co., Cincinnati, O.

Lawn Sweepers.

Lape, W. E., Syracuse, N. Y.

Lawn Swings.

Davies, Chas. & Co., Williamsport, Pa.

Lemon Squeezers.

Ripley Mfg. Co., Unionville, Conn.

Letters. Paper.

Tablet & Ticket Co., Chicago, Ill

Machinery.

Am. Tool Works, Cleveland, Ohio.
 Barnes, W. F. & John, Rockford, Ill.
 Becker, Jno. Mfg. Co., Pittsburg, Mass.
 Bement, Miles & Co., Philadelphia, Pa.
 Bigelow, C. E., 45 Day, N. Y.
 Birmingham & Keeler Mfg. Co., St. Louis, Mo.
 Birmingham Iron Foundry, Birmingham, Conn.
 Bliss, E. W. Co., Brooklyn, N. Y.
 Bogert, Jno. L., Flushing, N. Y.
 Briggs, Marvin, 12 Broadway, N. Y.
 Brown & Sharpe Mfg. Co., Providence, R. I.
 Carlin's Sons, Thos., Allegheny, Pa.
 Chin. Milling Mch. Co., Cincinnati, Ohio.
 Clapp, Geo. M., 74 Cortlandt, N. Y.
 Clough & McKenzie Mch. Co., Bridgeport, Conn.
 Crutcher, D. B., Providence, R. I.
 Detrick & Harvey Mch. Co., Baltimore, Md.
 Ehrhardt, Gustave & Sons, Pittsburg, Pa.
 Fitchburg Mch. Works, Fitchburg, Mass.
 Garvin Mch. Co., Light & Canal St. Gould & Eberhardt, Newark, N. J.
 Hamilton Mch. Tool Co., Hamilton, O.
 Harrison, E. Son & Co., Phila., Pa.
 Hendley Machine Co., Torrington, Ct.
 Hill, Clarke & Co., Boston, Mass.
 Ingersoll Milling Machine Co., Rockford, Ill.
 Johnson, Israel H., Jr., & Co., Phila.
 Jones & Lamson Mch. Co., Springfield, Vt.
 Kelly, Daniel, Phila., Pa.
 Lodge & Davis Mch. Tool Co., Cincinnati, O.
 Lodge & Shipley Mch. Tool Works, Cincinnati, O.
 Lovegrove & Co., Philadelphia, Pa.
 McCabe, J. J., 68 Cortlandt, N. Y.
 Niles Tool Wks., 138 Liberty St., N. Y.
 Manville, E. J. Mch. Co., Waterbury, Conn.
 Morton Mfg. Co., Muskegon Heights, Mich.
 Newark Mch. Tool Works, Newark, N. J.
 New Haven Mfg. Co., New Haven, Conn.
 New York Machy Depot, N. Y.
 Niles Tool Wks., 138 Liberty St., N. Y.
 Pedrick & Ayer, Philadelphia, Pa.
 Pittsburg Mfg. Co., Pittsburg, Pa.
 Place, Geo., 120 Broadway, N. Y.
 Poole, Robt. & Son Co., Baltimore, Md.
 Powell Planer Co., Worcester, Mass.
 Pratt & Whitney Co., Hartford, Conn.
 Prentiss Tool & Supply Co., N. Y.
 Scranton Supply & Mch. Co., Scranton, Pa.
 Sellers, Wm. & Co., Phila.
 Seyfert's Sons L. F., Philadelphia, Pa.
 Steptoe, J. & Co., Cincinnati, O.
 Stow Flexible Shaft Co., Ltd., Phila.
 Toomey, Frank, Phila., Pa.
 Wetherill, Robt. & Co., Chester, Pa.
 Wilson, W. A., Rochester, N. Y.
 Woodruff Mfg. Co., Hartford, Conn.

Machinery for Hardware Manufacturers.
 Add. Jno. & Son, New Haven, Conn.

Machine Knives.
 Corning Coes & Co., Worcester, Mass.

Machine Tools.—See machinery.

Machine Work.
 Papping, J., 58th St., & 11th Ave., N. Y. City.

Machinists' Scales.
 Coffin & Leighton, Syracuse, N. Y.
 Starrett, L. S., Athol, Mass.

Machinists' Tools and Supplies.
 Brown & Sharpe Mfg. Co., Providence, R. I.
 King, J. M. & Co., Waterford, N. Y.
 Sellers, Wm. & Co., Inc., Phila.

Mallets.
 N. Y. Mallet & Handle Works, N. Y.

Mangles.
 The Lang Mfg. Co., Racine, Wis.

Manufacturing Sites.
 Kokomo Enterprise Co., Kokomo, Ind.

Measuring Tapes.
 Lufkin Rule Co., Saginaw, Mich.

Meat Cutters.
 Enterprise Mfg. Co., Philadelphia, Pa.

Mechanical Drawing.
 Correspondence School of Mechanics, Scranton, Pa.

Metals.
 Fearing, Wm. S., 100 Chambers, N. Y.
 Hendricks Bros., 49 Cliff, N. Y.
 Naylor & Co., 45 Wall, N. Y.

Metal Brokers.
 American Metal Co., N. Y.

Metallurgists.
 Britton, J. Blodgett, Phila.

Metal Saws.
 Ehrhardt, Gustave & Sons, Pittsburg, Pa.
 Q & C Co., Chicago, Ill.

Milling Machines.
 Brown & Sharpe, Providence, R. I.
 Chin. Milling Mch. Co., Cincinnati, Ohio.
 Ingersoll Milling Machine Co., Rockford, Ill.
 Pedrick & Ayer, Phila., Pa.

Mining Knives.
 Palmer Hdw. Mfg. Co., Troy, N. Y.

Mine Lamps.
 Darby, Edw. & Sons, Phila.
 Leonard, B. E., Scranton, Pa.
 Leonard, T. F., Scranton, Pa.

Mining Screens.
 Harrington & King Perforating Co., Chicago, Ill.
 Howard & Morse, 45 Fulton, N. Y.

Mirrors.
 Rice, C. F., Chicago, Ill.

Molding Sand.
 Chicago Foundry Supply Co., Chicago, Ill.
 Obermayer, S. Co., Cincinnati, O.
 Paxson, J. W. & Co., Phila.

Motors, Water and Electric.
 C. & C. Electric Motor Co., 402 and 404 Greenwich St., N. Y.
 Dallett, Thos. H. & Co., Phila., Pa.
 Thomson, Houston Motor Co., Boston, Mass.

Nail Machinery.
 Pittsburgh Mfg. Co., Pittsburg, Pa.

Nails (Cut) and Spikes.
 Burden & Lovell, 70 West, N. Y.
 Cumberland Nail & Iron Co., Phila.
 Oxford Iron Co., 81 Washington, N. Y.
 Pottstown Iron Co., Pottstown, Pa.
 Riverside Iron Wks., Wheeling, W. Va.

Nickel Platers' Supplies.
 Zucker & Levett Chemical Company, 10 to 14 Grand St., N. Y.

Notary Shapes, Rollers of.
 Rowland, William & Harvey, Framford, Philadelphia

Nut Machines.
 Danham Nut Mch. Co., Unionville, Ct.

Nuts, Bolts, &c., Makers of.
 American Bolt Co., Lowell, Mass.
 American Screw Co., Providence, R. I.
 Blake & Johnson, Waterbury, Conn.
 Hattell, Wm. H. Co., Pawtucket, R. I.
 Mt. Carmel Bolt Co., Mt. Carmel, Conn.
 Fort Chester Bolt and Nut Co., Chester, N. Y.
 Russell, Burdett & Ward, Port Chester, N. Y.
 Stranberg, J. H. & Son, Reading, Pa.
 Wilson, J. Fred., Worcester, Mass.
 Wm. H. Haskell Co., Pawtucket, R. I.

Oil Stones.
 Pike Mfg. Co., Pike Station, N. H.

Oil Stoves.
 Glazier Stove Co., Chelsea, Mich.

Ores.
 Wister, Francis, Philadelphia, Pa.

Presses.
 Scranton Forging Co., Scranton, Pa.

Rolling.
 Billington, Jas. H. & Co., Phila., Pa.
 Morrison, Robt., St. Louis, Mo.
 N. Y. Belting & Packing Co. Ltd., N. Y.

Rolls.
 Ames Sword Co., Chicopee, Mass.
 Baldwin, E. T., Lancaster, Pa.
 Ellstrand & Wolf, Phila., Pa.
 Miller Lock Co., Philadelphia, Pa.

Rolls.
 Detroit Graphite Mfg. Co., Detroit, Mich.
 Dixon, Jos. Crucible Co., Jersey City, N. J.

Rolling Burners.
 Dangler Stove & Mfg. Co., Cleveland, O.

Rolling Mills.
 Fitzgerald, S. C., Washington, D. C.
 Johnson & Howson, Phila. & Washgton.
 Janner, H. W. T., Washington, D. C.
 Stocking, E. B., Washington, D. C.

Perforated Metal.
 Clinton Wire Cloth Co., Clinton, Mass.
 Harrington & King Perforating Co., Chicago, Ill.

Phosphor Bronze.
 Phosphor Bronze Smelting Co., Limited, 512 Arch, Philadelphia.

Phosphor Tin.
 Crescent Phosphorized Metal Co., Philadelphia, Pa.
 Crosby Steam Gauge & Valve Co., Boston, Mass.
 Haik & Naumann, 516 Pearl, N. Y.

Picks and Mattocks.
 Plumb, Fayette R., Philadelphia, Pa.

Pig Iron.
 Houston, C. B. & Co., Philadelphia, Pa.
 Main, Edwin R., Philadelphia, Pa.
 Moitour Iron & Steel Co., Danville, Pa.
 Naylor & Co., 45 Wall, N. Y.
 Piccards, Brown & Co., Chicago, Ill.
 Pilling & Crane, Philadelphia, Pa.
 Samuel, Frank, Philadelphia, Pa.

Pig Iron Storage.
 Am. Pig Iron Storage Warrant Co., 44 Wall, N. Y.

Pile Drivers.
 Vulcan Iron Wks., Chicago, Ill.

Pipe, Bent.
 National Pipe Bending Co., New Haven, Conn.

Pipe Cutting and Threading Machines.
 Bignall & Keeler Mfg. Co., St. Louis, Mo.
 Merrill Mfg. Co., Toledo, O.
 Panzer, Henry B. & Co., Philadelphia.
 Sauder's Sons, D., Yonkers, N. Y.

Pipe Grips.
 Prentiss Vise Co., 44 Barclay, N. Y.

Pipes, Fittings, &c., Makers of.
 McNab & Hardin Mfg. Co., N. Y.

Pipe, Water and Gas, Makers of.
 Cumberland Nail & Iron Co., Phila.
 Donaldson Iron Co., Emaus, Pa.
 Riverside Iron Works, Wheeling, W. Va.
 Wood, R. D. & Co., Philadelphia, Pa.

Plane Irons, Manufacturers of.
 Bulk Bros., Milbury, Mass.

Planes, Manufacturers of.
 Stanley Rule & Level Co., N. Y.

Plate, Iron and Steel, Mfrs of.
 Etta-Standard Iron & Steel Co., Bridgeport, Ct.
 Etta-Standard Iron & Steel Co., Coatesville, Pa.
 Mahoning Valley Iron Co., Youngstown, Ohio.
 Macnead, McLean Co., Pittsburgh, Pa.
 McFain & Sons, Reading, Pa.
 Pottstown Iron Co., Pottstown, Pa.
 Pottsville Iron & Steel Co., Pottsville, Pa.
 Singer, Nimick & Co., Pittsburgh, Pa.
 The Mahoning Valley Iron Co., Youngstown, O.
 Weiman Iron & Steel Co., Thurlow, Pa.
 Wood Alan Co., Philadelphia.

Plating, Nickel, Brass and Silver.
 Wilnot & Hobbs Mfg. Co., Bridgeport, Conn.

Plumbago.
 Chicago Fdy. Supply Co., Chicago, Ill.

Pokers and Lifters.
 Troy Nickel Works, Troy, N. Y.

Polishing Machines.
 Watson & Stillman, 204 E. 43d, N. Y.

Polishing Wheel.
 J. A. Massena, C. E. & Co., Newark, N. J.

Post Hole Diggers.
 Ohler, F. E. & Co., Canton, O.
 Wister, L. R. & Co., Philadelphia, Pa.

Poultry Nettings.
 Barnum, E. T., Detroit, Mich.
 Gilbert & Bennett Mfg. Co., 42 Cliff St., N. Y.
 N. J. Wire Cloth Co., Trenton, N. J.
 "Silver Finish."
 Tyler Wire Wks. Co., W. S., Cleveland, O.
 Wright & Colton Wire Cloth Co., Worcester, Mass.

Power.
 Ladin & Raud Powder Co., 29 Murray New York Powder Co., 62 Liberty St., N. Y.

Power Hack Saws.
 Millers Falls Co., 93 Reade St., N. Y.
 Stover Novelty Wks., Freeport, Ill.

Power Hammers.
 Bradley & Co., Syracuse, N. Y.
 Selden Mach. Co., New Haven, Conn.
 Deniet & Eisenhardt, Philadelphia.
 Dupont Mfg. Co., St. Johnsbury, Vt.
 Jenkins & Lunge, Bellefonte, Pa.
 Long & Allstatter Co., Hamilton, Ohio

Presses, Dies, &c.
 E. W. Bliss Co., Brooklyn, N. Y.
 Crosby, G. A. & Co., Chicago, Ill.
 Niagara Stamping and Tool Co., Buffalo, N. Y.
 Stark Mch. & Tool Co., Buffalo, N. Y.
 Stiles & Parker Press Co., Brooklyn, N. Y.
 Waterbury Mch. Co., Waterbury, Conn.

Presses, Power, Makers of.
 Bliss, E. W. Co., Brooklyn, N. Y.
 Manville, E. J. Mch. Co., Waterbury, Ct.
 Merriman, A. H., Meriden.
 Niagara Stamping and Tool Co., Buffalo, N. Y.
 Stark Mch. & Tool Co., Buffalo, N. Y.
 Waterbury Farrel Foundry and Machine Co., Waterbury, Conn.

Pulleys.
 Keystone Clutch, Mch. Wks., Phila., Pa.

Pulverizing Mill.
 Bradley Fertilizer Co., Boston, Mass.

Pumping Machinery.
 Coulter & McKenize Mch. Co., Bridgeport, Conn.
 Dean Bros. Steam Pump Works, Indianapolis, Ind.
 Hooker-Colville Steam Pump Co., Chicago, Ill.
 McGowan, J. H. & Co., Cincinnati, O.
 Maslin, J. & Son, Jersey City, N. J.
 Norwalk Iron Wks. Co., So. Norwalk, Conn.
 Southwark Fdy. & Mch. Co., Phila., Pa.
 Valley Pump Wks., Easthampton, Mass.
 Worthington, Henry R., 86 & 88 Liberty St., N. Y.

Pumps, Makers of.
 Bellevue Pump Co., Bellevue, Iowa.
 Deming Co., Salem, O.
 Douglas, W. B., Middletown, Conn.
 Mac, Poots & Co., Springfield, O.
 Myers, F. E. & Bro., Ashland, O.
 St. Joseph Pump Co., St. Joseph, Mo.

Punches and Shears, Hand and Power.
 E. W. Bliss Co., Brooklyn, N. Y.
 Cockburn Barrow & Mch. Co., Jersey City, N. J.
 Crosby, G. A. & Co., Chicago, Ill.
 Long & Allstatter Co., Hamilton, Ohio.
 New Doty Mch. Co., Janesville, Wis.
 Niagara Stamping and Tool Co., Buffalo, N. Y.
 Stark Mch. & Tool Co., Buffalo, N. Y.
 Stiles & Parker Press Co., Brooklyn, N. Y.
 Wals & Roos, Punch & Shear Co., Cincinnati, Ohio.
 Waterbury Farrel Foundry and Mch. Co., Waterbury, Conn.
 Watson & Stillman, 204 E. 43d, N. Y.

Rails, Old and New.
 Hir, H. L., Chicago, Ill.
 Perry, W. H. & Co., Providence, R. I.
 Schwarzenberg Bros. & Co., Cleveland, O.

Rat and Mouse Traps.
 Burditt & Williams, Boston, Mass.
 Eatey, W. S., 65 Fulton, N. Y.
 Ripley Mfg. Co., Unionville, Conn.

Razors.
 Butcher, W. & S., 135 Duane St., N. Y.
 Curley, J. & Bro., 6 Warren St., N. Y.
 Electric Cutlery Co., 113 Chambers, N. Y.
 Schmitz, E. Lothar, 92 Reade St., N. Y.
 J. A. Torrey Razor Co., Worcester, Mass.

Refrigerator Door Fasteners.
 Conroy, P. J. & Co., Philadelphia.

Rivets.
 Blake & Johnson, Waterbury, Conn.
 Burden Iron Co., Tr y, N. Y.
 Cobb & Drew, Plymouth, Mass.
 Henderson, Jas. S., 165 Greenwich, N. Y.
 Plymouth Mills, Plymouth, Mass.
 Sternberg, J. H. & Son, Reading, Pa.
 Townsend, W. F. & Co., New Brighton, Pa.

Riveting Machines.
 Add. Jno. & Sons, New Haven, Conn.

Roasters and Bakers.
 Matthal, Ing. am & Co., Baltimore, Md.

Rock Drills.
 Penns. Diamond Drill & Mfg. Co., Bridgeport, Pa.
 Rand Drill Co., 23 Park Place, N. Y.

Rolling Mill Machinery.
 Birmingham Iron Fdy., Birmingham, Conn.
 Booth, The Lloyd Co., Youngstown, O.
 Leeburg Foundry & Mch. Co., Pittsburg, Pa.
 Mahoning Fdry & Mch. Co., Danville, Pa.
 Morgan Construction Co., Worcester, Mass.
 Robinson-Rea Mfg. Co., Pittsburg, Pa.
 Totten & Hogg Iron and Steel Fdry Co., Pittsburg, Pa.
 Trethewey Mfg. Co., Pittsburg, Pa.
 Waterbury Farrel Foundry & Mch. Co., Waterbury, Conn.

Roll Lathes.
 Totten & Hogg Iron & Steel Fdry Co., Pittsburg, Pa.

Rolls, Chilled, Sand and Steel.
 Booth, The Lloyd Co., Youngstown, O.
 Garrison, A. Fdy. Co., Pittsburg, Pa.
 Johnson Foundry Co., Johnstown, Pa.
 Seaman, Sleeth & Black, Pittsburg, Pa.
 Totten & Hogg Iron and Steel Fdry Co., Pittsburg, Pa.

Roofing.
 Berlin Iron Bridge Co., E. Berlin, Conn.
 Boston Bridge Works, Boston, Mass.
 Cambridge Roofing Co., Cambridge, O.
 Johns, H. W. Mfg. Co., 87 Maiden Lane

Rope and Web Goods.
 Covert Mfg. Co., West Troy, N. Y.
 Covert's Saddlery Wks., Farmer, N. Y.

Rope Wheels.
 Cresson, Geo. V. Co., Philadelphia, Pa.

Rubber Goods.
 Canfield, H. O., Bridgeport, Conn.

Rules, Manufacturers of.
 Lufkin Rule Co., Saginaw, Mich.
 Standard Tool Co., Athol, Mass.
 Stanley Rule & Level Co., 29 Chambers, N. Y.

Sad Iron Holders.
 Kesner, J. L. & Co., Chicago, Ill.

Sad Irons.
 Universal Sad Iron Co., Milwaukee, Wis.

Sand Paper.
 Baeder, Adamson & Co., Phila., Pa.

Sash Balances.
 Caldwell Mfg. Co., Rochester, N. Y.
 Pullman Sash Balance Co., Rochester, N. Y.
 Stewart & Baker, Rochester, N. Y.
 Vanderbilt Sash Balance Co., Canandaigua, N. Y.

Sash Cords and Chains.
 Morton, Thos., 65 Elizabeth, N. Y.
 Ossawan Mills Co., Norwich, Conn.
 Samson Cordage Works, Boston, Mass.
 Smith & Egge, Mfg. Co., Bridgeport, Conn.

Sash Holders.
 Motley, Peter, Philadelphia, Pa.

Sash Locks.
 Ives, H. B. & Co., New Haven, Conn.

Sash Pulleys.
 Empire Portable Forge Co., Lansingburgh, N. Y.
 Palmer Hardware Mfg. Co., Troy, N. Y.

Sash Pulley Marker.
 Skelly, J. W. & Son, Bristol, Conn.

Sash Weights.
 Brown, E. E. & Co., Philadelphia, Pa.

Sash Weight Fasteners.
 Skelly, J. W. & Son, Bristol, Conn.

Saws, Makers of.
 Atkins, E. C. & Co., Indianapolis, Ind.
 Diston, Henry & Sons, Phila., Pa.
 Hiles, C. A. & Co., 333-335 Carroll Ave, Chicago, Ill.
 National Saw Co., 96 Reade St., N. Y.
 Simonds Mfg. Co., Fitchburg, Mass.

Saw Sets.
 Kohler, F. E. & Co., Canton, Ohio.
 Taintor Mfg. Co., 84-86 Chambers, N. Y.

Scales, Manufacturers of.
 Buffalo Scale Co., Buffalo, N. Y.
 Chastillon, John & Sons, 85-89 Cliff, N. Y.

Scrapers, Road.
 Am. Steel Scaper Co., Sidney, Ohio.
 Kilbourne & Jacobs Mfg. Co., Columbus, O.
 Sidney Steel Scaper Co., Sidney, O.

Screens, Door and Window.
 Queen Anne Screen Co., Burlington, Vt.

Screw Cutting Machinery.
 Wells Bros. & Co., Greenfield, Mass.
 Wiley & Russell Mfg. Co., Greenfield, Mass.

Screw Drivers.
 Brown, R. H. & Co., New Haven, Conn.
 Captrol Mfg. Co., Chicago, Ill.
 Chantrel Tool Co., Reading, Pa.
 Maynew, H. H., Schenectady Falls, Mass.

Screw Plate and Pipe Cutter.
 Jarecki Mfg. Co., Erie, Pa.

Screws, Makers of.
 American Screw Co., Providence, R. I.
 Blake & Johnson, Waterbury, Conn.
 Wm. H. Haskell Co., Pawtucket, Mass.
 Miles, F. S., 205 Quarry, Philadelphia.
 National Screw & Tack Co., Cleveland, Ohio.
 Reynolds & Co., New Haven, Conn.
 Worcester Machine Screw Co., Worcester, Mass.

Seroll Saws.
 Barnes, W. F. & John, Rockford, Ill.
 Seneca Falls Mfg. Co., Seneca Falls, N. Y.

Seythe Stones and Whetstones.
 Pike Mfg. Co., Pike Station, N. H.
 Cleveland Stone Co., Cleveland, O.
 Huron Grindstone Co., Port Austin, Mich.

Shafting, Makers of.
 Cresson, Geo. V. Co., Philadelphia, Pa.
 Fairmount Mch. Co., Philadelphia, Pa.
 Fitzsimons & Co., Cleveland, Ohio.
 Sellers, Wm. & Co., Inc., Phila.
 Stow Mfg. Co., Binghamton, N. Y.

Shaped Iron and Steel, Manufacturers of.
 Etta-Standard Iron & Steel Co., Bridgeport, Ct.

- Allentown Rolling Mill.** Allentown, Pa.
Illinois Steel Co., Chicago, Ill.
Lockhart Iron & Steel Co., Pittsburg, Pa.
Passaic Rolling Mill Co., Paterson, N.J.
Pottsville Iron & Steel Co., Pottsville, Pa.
Roberts, A. & P. & Co., Phila., Pa.
The Phoenix Iron Co., Phila., Pa.
Tudor Iron Works, St. Louis, Mo.
- Shears and Scissors.**
Acme Shear Co., Bridgeport, Conn.
Heinrichs, R. Sons Co., Newark, N. J.
- Sheet Iron and Steel, Manufacturers of.**
Etna Standard Iron and Steel Co., Bridgeport, Conn.
Cambridge Iron & Steel Co., Cambridge, Ohio.
Cheese Bros., Pittsburg, Pa.
Mahoning Valley Iron Co., Livingston, Ohio.
Moorehead-McCleane Co., Pittsburg, Pa.
Pierson & Co., 29 Broadway, N. Y.
Reilly, John W., Fort Hunter P. O., Pa.
Singer, Nimick & Co., Ltd., Pittsburg, Pa.
The Mahoning Valley Iron Co., Youngstown, O.
Alan Wood Co., Philadelphia.
W. Dewees Wood Co., McKeesport, Pa.
- Sheet Metal Work.**
Clark & Cowles, Plainville, Conn.
- Sheet Zinc.**
Matthiessen & Hegeler Zinc Co., La Salle, Ill.
- Shelf Brackets.**
Koch, A. B. & Co., Peoria, Ill.
- Shovels, Spades and Scoops.**
Myers, H. M. Co., Beaver Falls, Pa.
- Slings.**
Douglas, W. & B., Middletown, Conn.
- Skates, Ice.**
Dame, Stoddard & Kendall, Boston, Mass.
Winslow, Sam'l, Skate Mfg. Co., Worcester, Mass.
- Skates, Roller.**
Henley, M. C., Richmond, Ind.
Winslow, Sam'l, Skate Mfg. Co., Worcester, Mass.
- Smelting Works.**
Reeves, Paul S., 780 S. Broad, Phila.
- Speaking Tubes.**
Ostrander, W. R. & Co., 204 Fulton St., N. Y.
Wollensak, J. F., Chicago, Ill.
- Specialties, Pat. Articles.**
Konigsfrow, O., Cleveland, O.
- Speed Indicators.**
Church & Sleight, 102 Fulton St., N. Y.
- Spelter.**
Matthiessen & Hegeler Zinc Co., La Salle, Ill.
- Spoons and Forks.**
Holmes & Edwards Silver Co., Bridgeport, Conn.
Rogers, The Wm. Mfg. Co., Hartford, Conn.
- Sporting Goods.**
Hartley & Graham, 313-315 B'way, N. Y.
- Spring.**
American Spiral Spring Co., Pittsburg, Pa.
Dunbar Bros., Bristol, Conn.
Miller & Van Winkle, Brooklyn, N. Y.
Morgan Spring Co., Worcester, Mass.
Nourse, Fred. Co., 315 to 319 E. 22d St., N. Y.
Sabin Machine Co., Montpelier, Vt.
Tuck Mfg. Co., Brockton, Mass.
Washburn & Moen Mfg. Co., Worcester, Mass.
Wolf, R. H. & Co., Ltd., 118th St. and Harlem River, N. Y.
- Spring Hinges.**
Bardsley, J., 149 & 151 Baxter St., N. Y.
Fulman Sash Balance Co., Rochester, N. Y.
Stover Mfg. Co., Freeport, Ill.
Van Wagoner & Williams Co., 14 Warren St., N. Y.
- Spring Keys and Cotters.**
Whitman & Barnes Mfg. Co., Syracuse, N. Y.
- Sprinklers.**
Smith, Oliver A., Clarkston, Mich.
- Stamped Ware.**
Am. Stamping Co., 104 & 106 John St., New York
- Stamping Works.**
Avery Stamping Co., Cleveland, O.
Cleveland Stamping & Tool Co., Cleveland, O.
- Staples.**
Cobb & Drew, Plymouth, Mass.
Thibener E. H. & Co., Binghamton, N. Y.
- Steam Gauges.**
Ascher ft Mfg. Co., 111 Liberty St., N. Y.
Bristols Mfg. Co., Waterbury, Conn.
- Steam Hammers, &c., Makers of.**
Dienelt & Eisenhardt, Philadelphia.
Dudgeon, Richard, 24 Columbia Street, N. Y.
Tretheway Mfg. Co., Pittsburg, Pa.
- Steam Heating.**
Webster Warren & Co., Phila., Pa.
- Steam Separators.**
Goubert Mfg. Co., 34 Cortland St. N. Y.
- Steel Balls.**
Grant Anti-Friction Ball Co., Fitchburg, Mass.
- Steel, Cold Rolled Strip.**
Wilmot & Hobbs Mfg. Co., Bridgeport, Conn.
- Steel Figures and Alphabets.**
Krogerud, W., 61 Fulton, N. Y.
- Steel Importers.**
Abbott, Jere & Co., N. Y. and Boston.
Hobson, Francis, Seaman & Co., 91 John St., N. Y.
Jessop, Wm. & Sons, Sheffield, Eng.
land, or 91 John, N. Y.
Milne, A. & Co., 1 Broadway, N. Y.
Newton & Shipman, 83 John, N. Y.
Wetherell Bros., 93 Liberty St., N. Y.
Whitney, A. B. & Co., B'way, N. Y.
Wolf, R. H. & Co., Ltd., 118th Street and Harlem River, N. Y.
- Steel (Mushet's Special).**
Jones, B. M. & Co., Boston.
- Steel Manufacturers.**
Etna-Standard Iron & Steel Co., Bridgeport, Conn.
Bethlehem Iron Co., S. Bethlehem, Pa.
Baker, Herman & Co., 103 Duane St., Carbon Steel Co., Pittsburg, Pa.
Chester Steel Castings Co., Phila., Pa.
Chrome Steel Works, Brooklyn, N. Y.
Crecent Steel Co., Pittsburg, Pa.
Elken & Co., Hagen, Germany.
Frankford Steel Co., Philadelphia.
Gautier Steel Department of Cambria Iron Co., Johnstown, Pa.
Hobson, Francis, Seaman & Co., 91 John St., N. Y.
Illinois Steel Co., Chicago, Ill.
Jessop, Wm. & Sons, Sheffield, Eng.
land, or 91 John, N. Y.
Kayser, Ellison & Co., Sheffield, Eng.
La Belle Steel Co., Pittsburg, Pa.
Lukens Iron & Steel Co., Coatesville, Pa.
Moorhead-McCleane Co., Pittsburg, Pa.
Moss, F. W., 83 John, N. Y.
Naylor & Co., 45 Wall, N. Y.
Pennsylvania Steel Co., Steelton, Pa.
Pottsville Iron and Steel Co., Pottsville, Pa.
Reilly, J. W., Fort Hunter P. O., Pa.
Rowland, Wm. & Harvey, Frankford, Philadelphia.
Singer, Nimick & Co., Pittsburgh.
Stanley Works, New Britain, Conn.
Steel & Iron Improvement Co., Pittsburg, Pa.
Taylor Iron & Steel Co., High Bridge, N. J.
Wordlaw, S. & C., Sheffield, Eng.
Wetherell Bros., 93 Liberty, N. Y.
Wilmot & Hobbs Mfg. Co., Bridgeport, Conn.
- Steel, Manufacturers' Agents.**
Barnes, C. K. & Co., Philadelphia, Pa.
Corning, Edw. & Co., 29 B'way, N. Y.
Lindsay, Jas. G. & Co., Phila., Pa.
Pierson & Co., 29 Broadway, N. Y.
- Steel Rails, Manufacturers of.**
Bethlehem Iron Co., S. Bethlehem, Pa.
Cambria Iron Co., Johnstown, Pa.
Illinois Steel Co., Chicago, Ill.
Penna. Steel Co., Steelton, Pa.
Montour Iron & Steel Co., Danville, Pa.
Riverside Iron Wks., Wheeling, W. Va.
- Steel Spiral Springs, Manufacturers.**
Chatillon, John & Sons, N. Y.
Roland, Wm. & Harvey, Frankford, Phila.
Wolf, R. H. & Co., Ltd., 118th Street and Harlem River, N. Y.
- Steel, Tool.**
Frankford Steel Co., Philadelphia, Pa.
Jessop, Wm. & Sons, Sheffield, Eng.
land, or 91 John, N. Y.
Jones, B. M. & Co., Boston, Mass.
La Belle Steel Co., Pittsburg, Pa.
- Step Ladders.**
Bicycle Step Ladder Co., Chicago, Ill.
Croissant, M., Albany, N. Y.
- Stocks and Dies.**
Armstrong Mfg. Co., Bridgeport, Conn.
Billings & Spencer Co., Hartford, Conn.
Butterfield & Co., Dept. Line, Vt.
Hart Mfg. Co., Cleveland, O.
Saunders Sons, D., Yonkers, N. Y.
Wells Bros. & Co., Greenfield, Mass.
Wiley & Russell Mfg. Co., Greenfield, Mass.
- Storage.**
Security Warehouse, E. St. Louis, Ill.
- Stove Linings.**
Ostrander Fire Brick Co., Troy, N. Y.
- Stove Pipe Thimbles.**
Cheney, S. & Son, Manlius, N. Y.
- Stove Trimmings.**
Troy Nickel Works, Troy, N. Y.
- Street Lamps.**
Dietz, R. E. & Co., 60 Laight St., N. Y.
Steam Gauge & Lantern Co., Syracuse, N. Y.
- Strops.**
Electric Cutlery Co., 113 Chambers, N. Y.
J. R. Torrey & Co., Worcester, Mass.
- Strapping Machines.**
Schmitz, E. Lothar, 92 Reade St., N. Y.
- Structural Iron Work.**
Berlin Iron Bridge Co., East Berlin, Conn.
Boston Bridge Wks., Boston, Mass.
Lindsay, Jas. G. & Co., Phila., Pa.
Wrought Iron Bridge Co., Canton, O.
- Sulphuric Acid.**
Matthiessen & Hegeler Zinc Co., La Salle, Ill.
- Tacks, Brads, Staples, &c.**
Atlas Tack Corporation, Boston, Mass.
Cobb & Drew, Plymouth, Mass.
Grand Crossing Tack Co., Grand Crossing, Ill.
Nat. Screw & Tack Co., Cleveland, O.
Phillips, E. & Sons, South Hanover, Plymouth Mills, Plymouth, Mass.
Trufant, W. E., Whitman, Mass.
- Taps and Dies.**
F. J. Terfield & Co., Derby Line, Vt.
Carpenter, J. M., Tap & Die Co., Pawtucket, R. I.
Manning, Maxwell & Moore, 111 Liberty St., N. Y.
Wells Bros. & Co., Greenfield, Mass.
Wiley & Russell Mfg. Co., Greenfield, Mass.
- Testing Laboratories.**
Riehle Bros. Testing Mch. Co., Philadelphia.
- Testing Machines.**
Riehle Bros. Testing Mch. Co., Phila.
- Theatrical Hardware.**
Wollensak, J. F., Chicago, Ill.
- Thill Springs.**
Frost Thill Spring Co., Boston, Mass.
Sabin Machine Co., Montpelier, Vt.
- Time Record.**
Scattergood, H. W., Phila., Pa.
- Tinners' Hardware.**
Berger Bros., Philadelphia, Pa.
- Tinning Process.**
Sands, Thomas, Nashua, N. H.
- Tin Plate Machinery.**
Lloyd Booth Co., Youngtown, Ohio.
- Tinware.**
Am. Stamping Co., 104 & 106 John St., Matthal, Ingram & Co., Baltimore, Md.
- Tire Upsetters.**
Butts & Ordway, Boston, Mass.
Illinois Iron & Bolt Co., Carpentersville, Ill.
- Toe Calks, Steel.**
Burke, F. F., Boston, Mass.
- Tool Chests.**
Am. Tool Co., 200 W. Houston St., N. Y.
- Tools.**
Atkins, E. C. & Co., Indianapolis, Ind.
Britton, Horace E., Stoughton, Mass.
Brown, R. H. & Co., New Haven, Conn.
Chanvrell Tool Co., Reading, Pa.
Mayhew, H. H. Co., Shelburne Falls, Mass.
Wheeler Falls Co., 93 Reade, N. Y.
Richardson, C. F. & Son, Athol, Mass.
Standard Tool Co., Athol, Mass.
Stanley Rule & Level Co., 29 Chambers, Starrett, L. S., Athol, Mass.
- Tools, Blacksmith and Wheelwrights.**
Buffalo Forge Co., Buffalo, N. Y.
Butts & Ordway, Boston, Mass.
Champion Blower & Forge Co., Lancaster, Pa.
Illinois Iron & Bolt Co., Carpentersville, Ill.
Piomb, Fayette R., Philadelphia, Pa.
Wiley & Russell Mfg. Co., Greenfield, Mass.
- Tools, Steam and Gas Fitters'.**
Saunders Sons, D., Yonkers, N. Y.
- Torches, Oil and Gasolene.**
Danzler Stove & Mfg. Co., Cleveland, O.
Schneider & Trenkamp Co., Cleveland, Ohio.
- Transom Lifters.**
Wollensak, J. F., Chicago, Ill.
- Trucks, Manufacturers of.**
Berger Bros., Philadelphia, Pa.
Boston & Lockport Block Co., Boston, Mass., and Lockport, N. Y.
Clark, G. P., Windsor Locks, Conn.
Lansing Wheelbarrow Co., Lansing, Mich.
- Tubes, Seamless Drawn Copper.**
Ansonia Brass & Copper Co., 19 and 21 Cliff, N. Y.
Randolph & Clowes, Waterbury, Conn.
- Tubes, Steel.**
Leng's John S. Son & Co., 4 Fletcher St., New York.
- Turnbuckle Barrels.**
Henderson Bros., Waterbury, Conn.
- Turnbuckles.**
Cleveland City Forge & Iron Co., Cleveland, O.
Merrill Bros., Brooklyn, E. D.
- Twine Cutters.**
Wild, A. L., Providence, R. I.
- Twist Drills, Makers of.**
Cleveland Twist Drill Co., Cleveland, O.
Morse Twist Drill & Machine Co., New Bedford, Mass.
New Process Twist Drill Co., Taunton, Mass.
Standard Tool Co., Cleveland.
- Valves, Gas, Water and Steam.**
Best, Fox & Co., Pittsburg, Pa.
Chapman Valve Mfg. Co., Boston.
Jenkins Bros., 71 John, N. Y.
McNab & Harlin Mfg. Co., 56 John N. Y.
Mass. Regulator Co., Boston, Mass.
- Ventilator Appliances.**
Howard & Morse, 45 Fulton, N. Y.
- Vise Jaws.**
Newark Mch. Tool Co., Newark, N. J.
- Vises.**
Hollands Mfg. Co., Erie, Pa.
Howard Iron Works, Buffalo, N. Y.
Millers Falls Co., 93 Reade St., N. Y.
Prentiss Vise Co., 44 Barclay N. Y.
Van Wagoner & Williams Co., 14 Warren St., N. Y.
- Wagon Jacks.**
Boston & Lockport Block Co., Boston, Mass., and Lockport, N. Y.
Covert Mfg. Co., West Troy, N. Y.
Covert's Saddlery Works, Farmer, N. Y.
- Washers.**
Haskell, Wm. H. Co., Pawtucket, R. I.
Milton Mfg. Co., Milton, Pa.
Sternbergh, J. H. & Son, Reading, Pa.
- Water Meters.**
Worthington, A. Henry R., 88 & 88 Liberty St., N. Y.
- Water Wheels.**
F. Cole, Robt. & Son Co., Baltimore, Md.
- Well Boring Machines.**
Oil Well Supply Co., Pittsburg, Pa.
- Well Machinery.**
Amer. Well Works, Aurora, Ill.
- Wheelbarrows.**
Akron Tool Co., Akron, O.
Amer. Steel Scrap Co., Sidney, Ohio.
Cockburn Barrow & Mch. Co., Jersey City, N. J.
Kilbourne & Jacobs Mfg. Co., Columbus, Ohio.
- Lansing Wheelbarrow Co.,** Lansing, Mich.
Sidney Steel Scraper Co., Sidney, O.
Sweet Mfg. Co., Minneapolis, Minn.
- Whips.**
American Whip Co., Westfield, Mass.
- Window Cord, Makers of.**
Samson Cordage Works, Boston, Mass.
- Wire, Manufacturers of.**
Amer. Spiral Spring Co., Pittsburg, Pa.
Amer. Wire Nail Co., Anderson, Ind.
Consolidated Steel & Wire Co., St. Louis, Mo.
Gautier Steel Department of Cambria Iron Co., Johnstown, Pa.
Miller & Van Winkle, Brooklyn, N. Y.
New Castle Wire Nail Co., New Castle, Pa.
New Haven Wire Mfg. Co., New Haven, Conn.
Prentiss, Geo. W. & Co., Holyoke, Mass.
Salem Wire Nail Co., Salem, O.
Trenton Iron Co., Trenton, N. J.
Washburn & Moen Mfg. Co., Worcester, Mass.
Wetherell Bros., 93 Liberty St., F. Y.
Wolf, R. H. & Co., Ltd., 118th St. and Harlem River, N. Y.
Wright & Colton Wire Cloth Co., Worcester, Mass.
- Wire Cloth.**
Barnum, E. T., Detroit, Mich.
Clinton Wire Cloth Co., Clinton, Mass.
Darby, Edward & Sons, Philadelphia.
Estey, W. S., 65 Fulton, N. Y.
Gilbert & Bennett Mfg. Co., 42 Cliff, N. Y.
Howard & Morse, 45 Fulton, N. Y.
N. J. Wire Cloth Co., Trenton, N. J.
Rance Wire & Iron Wks., Milwaukee, Wis.
Scheeler & Sons, Buffalo, N. Y.
Wickwire Bros., Cortland, N. Y.
Wright & Colton Wire Cloth Co., Worcester, Mass.
W. S. Tyler Wire Works Co., Cleveland.
- Wire Cutters.**
King, J. M. & Co., Watertown, N. Y.
- Wire Dies.**
McFarland, Wm., Trenton, N. J.
Newton & Shipman, 83 John, N. Y.
- Wire Door Mats.**
Hartman Mfg. Co., Beaver Falls, Pa.
The Wire Goods Co., Worcester, Mass.
White Mfg. Co., Minneapolis, Minn.
- Wire Fences.—See Fencing, Iron and Wire.**
- Wire Goods, Manufacturers of.**
Darby, Edward & Sons, Phila.
Gilbert & Bennett Mfg. Co., 42 Cliff St., N. Y.
Ludlow-Saylor Wire Co., St. Louis.
Ossawa Mills Co., Norwich, Conn.
Scheeler & Sons, Buffalo, N. Y.
Whitman & Barnes Mfg. Co., Syracuse, N. Y.
- Wire Goods Co.,** Worcester, Mass.
Wickwire Bros., Cortland, N. Y.
Williamson, C. T., Wire Novelty Co., Newark, N. J.
- Wire Machinery.**
Am. Tool Wks., Cleveland, O.
Manville, E. J. Mch. Co., Waterbury, Ct.
Morgan Construction Co., Worcester, Mass.
Waterbury Mch. Co., Waterbury, Conn.
- Wire Straightening and Cutting Machinery.**
Adt, John & Son, New Haven, Conn.
- Wire Nails.**
Amer. Wire Nail Co., Anderson, Ind.
Consolidated Steel & Wire Co., St. Louis, Mo.
Indiana Wire Fence Co., Crawfordsville, Ind.
Kilmer Mfg. Co., Newburg, N. Y.
New Castle Wire Nail Co., New Castle, Pa.
Phillips, E. & Sons, South Hanover, Mass.
Phillips, Townsend & Co., Phila.
Plymouth Mills, Plymouth, Mass.
Salem Wire Nail Co., Salem, O.
Whitney, A. K. & Co., New York City
- Wire Ropes, Steel.**
Amer. Wire Nail Co., Anderson, Ind.
Consolidated Steel & Wire Co., St. Louis, Mo.
Illinois Steel Co., Chicago, Ill.
New Castle Wire Nail Co., New Castle, Pa.
Washburn & Moen Mfg. Co., Worcester, Mass.
Whitney, A. R. & Co., 17 B'way, N. Y.
Wolf, R. H. & Co., Ltd., 118th Street and Harlem River, N. Y.
- Wire Rope, Iron and Steel Makers.**
Broderick & Bascom Rope Co., St. Louis, Mo.
California Wire Works, San Francisco.
Hazard Mfg. Co., Wilkesbarre, Pa.
A. Leschen & Sons Rope Co., St. Louis.
Trenton Iron Co., Trenton, N. J.
Washburn & Moen Mfg. Co., Worcester, Mass.
Williamsport Wire Rope Co., Williamsport, Pa.
- Woodenware.**
Tucker & Dorsey Mfg. Co., Indianapolis, Ind.
- Wood-Working Machinery.**
Fay, J. A., & Egan Co., Cincinnati, O.
Seneca Falls Mfg. Co., Seneca Falls, N. Y.
- Wrenches, Manufacturers of.**
Bemis & Hall Hardware & Tool Co., Springfield, Mass.
Billings, Spencer & Co., Hartford, Conn.
Capitol Mfg. Co., Chicago, Ill.
Central Iron & Steel Co., Brazil, Ind.
Coca Wrench Co., Worcester, Mass.
Keystone Mfg. Co., Buffalo, N. Y.
Portsmouth Wrench Co., Boston, Mass.
Trumont Mfg. Co., Roxbury, Mass.
Williams, J. H., Brooklyn, N. Y.
- Wringers.**
Colby Winger Co., Montpelier, Vt.

ALPHABETICAL INDEX TO ADVERTISERS.

Abbott, Jere & Co.....	19	Buckeye Engine Co.....	34	Cumberland Nail & Iron Co.....	18	Haines Gauge Co.....	30
Acme Shear Co.....	75	Buffalo Forge Co.....	53&108	Curley, J. & Bro.....	75	Halk & Naumann.....	3
Adt, John & Son.....	48	Buffalo Scale Co.....	94	Cushman Chuck Co.....	48	Hall & Ross Husking Glove Co.....	99
Ætna-Standard Iron & Steel Co.....	21	Buffalo Edge Tool Works.....	74	Dallett, Thos. H. & Co.....	50	Halsey, Jas. T.....	47
Alken, Henry.....	27	Buffalo Specialty Mfg. Co.....	69	Dame, Stoddard & Kendall.....	80	Hamilton Machine Tool Co.....	43
Akron Tool Co.....	96	Bullock Bellows Co.....	44	Dangler Stove & Mfg. Co.....	77	Hammer & Co.....	94
Alexander Bros.....	38	Burden Iron Co.....	92	Darby, Edw. & Sons.....	8	Hardware Board of Trade.....	60
Allentown Rolling Mills.....	29	Burditt & Williams.....	86	Davies, Chas. & Co.....	74	Harrington, E., Son & Co.....	54
Almond, T. R.....	42	Burgess & Loxley.....	108	Davis & Cook.....	70	Harrington & King Perforating Co.....	11
Am. Bolt Co.....	90	Burke, P. F.....	93	Davis, I. B. & Son.....	62	Hart, Henry C. Mfg. Co.....	81
Am. Metal Co.....	4	Burnham, Geo. & Co.....	45	Davol, John & Sons.....	2	Hart Mfg. Co.....	49
Am. Pig Iron & Storage Warrant Co.....	15	Burr & Houston Co.....	27	Dayton Malleable Iron Co.....	108	Hartford Steam Boiler Insp. and Ins. Co.....	33
Am. Screw Co.....	14	Bussenius & Cunliffe.....	59	Dean Eros. Steam Pump Works.....	37	Hartley & Graham.....	1
Am. Spiral Spring Co.....	4	Butcher, W. & S.....	76	Deitz, A. E.....	91	Hartman Mfg. Co.....	9
Am. Stamping Co.....	85	Butterfield & Co.....	49	DeKalb Fence Co.....	9	Haskell, Wm. H. Co.....	100
Am. Steel Scraper Co.....	96	Butts & Ordway.....	45	Deming Co.....	68	Hazard Mfg. Co.....	6
Am. Tool Co.....	79	C. & C. Electric Motor Co.....	32	Detrick & Harvey Machine Co.....	53	Heinisch's R. Sons Co.....	75
Am. Tool Works.....	57	Caldwell Mfg. Co.....	88	Detroit Cork Screw Co.....	83	Henderson Bros.....	30
Am. Well Works.....	35	California Wire Works.....	5	Detroit Foundry Equipment Co.....	31	Hendey Machine Co.....	64
Am. Whip Co.....	107	Cambria Iron Co.....	20	Detroit Graphite Mfg. Co.....	29	Hendricks Bros.....	2
Am. Wire Nail Co.....	13	Cambridge Iron & Steel Co.....	25	Diamond State Iron Co.....	92	Henley, M. C.....	83&93
Ames Sword Co.....	88	Cambridge Roofing Co.....	15	Dienelt & Eisenhardt.....	45	Henn, A. S. & Co.....	86
Ansonia Brass & Copper Co.....	2	Canfield, H. O.....	39	Dietz, R. E. Co.....	83	Herbrand Co.....	24
Arcade Malleable Iron Co.....	25	Capitol Mfg. Co.....	95	Diston, Henry & Sons.....	71	Herrick, J. A.....	31
Armstrong Mfg. Co.....	44	Carbon Steel Co.....	21	Dixon, Jos., Crucible Co.....	39	Hiertz, T. & Son.....	4
Arnold, F. H.....	6	Carlin's Sons, Thomas.....	59	Donaldson Iron Co.....	27	Hiles, C. A. & Co.....	70
Artificial Gas Engineering Co.....	30	Carpenter, J. M. Tap & Die Co.....	107	Doscher, Martin.....	75	Hillebrand & Wolf.....	47
Aschman Steel Casting Co.....	27	Carten, Henry J.....	31	Douglas, W. & B.....	68	Hill, Clarke & Co.....	58
Ashcroft Mfg. Co.....	35	Chadborne & Coldwell Mfg. Co.....	99	Draper Machine Tool Co.....	61	Hirsch, L. K.....	59
Atkins, E. C. & Co.....	70	Chambers Bros. Co.....	100	Dudgeon, Richard.....	46	Hobson, F., Seaman & Co.....	19
Atlas Tack Corporation.....	12	Champion Blower & Forge Co.....	47	Duffy, J. A.....	61	Hoffman, J. W. & Co.....	18
Avery Stamping Co.....	1	Champion Iron Co.....	9	Dunbar Bros.....	5	Hogan, John L. & Co.....	18
Babcock & Wilcox Co.....	36	Chantrell Tool Co.....	66	Dunham Nut Machine Co.....	51	Hoggson & Pettis Mfg. Co.....	48
Baeder, Adamson & Co.....	66	Chapman Mfg. Co.....	108	Dupont Mfg. Co.....	41	Hollands Mfg. Co.....	69
Banker & White.....	72	Chapman Valve Mfg. Co.....	32	Durant, W. N.....	34	Holmes, Booth & Haydens.....	2
Bardsley, J.....	91	Chatillon, John & Sons.....	86	Dwight Slate Machine Co.....	44	Holmes & Edwards Silver Co.....	77
Barnes, C. K. & Co.....	22	Cheney, S. & Son.....	25	Eccles, Richard.....	90	Holt, Hiram & Co.....	99
Barnes, W. F. & John.....	42	Chess Bros.....	25	Edge Moor Iron Co.....	28	Horton & Son Co., E.....	48
Barnett, G. & H.....	73	Chester Steel Casting Co.....	26	Ehrhardt, Gustave & Sons.....	12	Hotchkiss, E. S.....	79
Barnum, E. T.....	9	Chicago Foundry Supply Co.....	29	Elken & Co.....	20	Houston, C. B. & Co.....	18
Bass Foundry & Machine Works.....	34	Chrome Steel Works.....	24	Electric Cutlery Co.....	76	Howard Iron Works.....	94
Becker, Jno. Mfg. Co.....	41	Church, Isaac.....	100	Emory, P. P. Mfg. Co.....	9	Howard & Morse.....	7
Belden Machine Co.....	42	Church & Sleight.....	38	Empire Portable Forge Co.....	87	Howson & Howson.....	6
Bell, Geo. E.....	54	Cincinnati Milling Mch. Co.....	63	Enterprise Mfg. Co. of Pa.....	85	Hudson, C. E. & Co.....	78
Bellevue Pump Co.....	69	Claften Mfg. Co.....	39	Erie Engine Works.....	36	Hulbert Bros. & Co.....	107
Bement, Miles & Co.....	45	Clapp, Geo. M.....	58	Estey, W. S.....	9	Hunt, Robert W. & Co.....	51
Bemis & Call Hardware & Tool Co.....	94	Clark, G. P.....	9	Ette & Henger Mfg. Co.....	99	Hurley Bros.....	42
Berger Bros.....	94	Clark & Cowles.....	6	Etting, Edw. J.....	18&28	Huron Grindstone Co.....	54
Berlin Iron Bridge Co.....	10	Cleveland Block Co.....	91	Eureka Cast Steel Co.....	108	Hussey, E. J. & Co.....	60
Best, Fox & Co.....	38	Cleveland City Forge & Iron Co.....	1	F. & N. Mfg. Co.....	98	Ideal Mfg. Co.....	81
Bethlehem Iron Co.....	22	Cleveland Novelty Co.....	93	Fairmount Machine Co.....	53	Illinois Iron & Bolt Co.....	46
Bevin Bros. Mfg. Co.....	31	Cleveland Rubber Works.....	78	Fay, J. A. & Egan Co.....	52	Illinois Pure Aluminum Co.....	86
Bickford Drill & Tool Co.....	52	Cleveland Stamping & Tool Co.....	85	Fearing, Wm. S.....	2	Illinois Steel Co.....	21
Bicycle Step Ladder Co.....	37	Cleveland Stone Co.....	62	Ferdinand, L. W. & Co.....	81	Indiana Wire Fence Co.....	3
Bigelow, C. R.....	58	Cleveland Twist Drill Co.....	50	Feld, Alfred & Co.....	74	Ingersoll Milling Machine Co.....	43
Bignall & Keeler Mfg. Co.....	46	Clinton Wire Cloth Co.....	8	Fitch, W. & E. T.....	107	Ives, H. B. & Co.....	94
Billings & Spencer Co.....	94	Cobb & Drew.....	9	Fitchburg Machine Works.....	45	Jacobus, W. H.....	160
Billington, J. H. & Co.....	33	Cockburn Barrow & Machine Co.....	98	Fitzgerald, S. C.....	6	Jarecki Mfg. Co.....	44
Bingham, W. Co.....	81	Coes, Loring & Co.....	95	Fitzsimons & Co.....	18	Jeffrey Mfg. Co.....	38
Birmingham Iron Foundry.....	25	Coes Wrench Co.....	95	Flagg, Stanley G. & Co.....	108	Jenkins Bros.....	1
Bissell, E. Son & Co.....	60	Coffin & Leighton.....	44	Forehand Arms Co.....	80	Jenkins & Lingle.....	42
Blake & Johnson.....	13	Colburn, A. L.....	49	Frahm, E. T.....	88	Jenner, H. W. T.....	6
Bliss Co., E. W.....	40	Colby Wringer Co.....	87	Frankford Steel Co.....	28	Jessop, Wm. & Sons.....	19
Boardman, L. & Son.....	67	Coldwell Lawn Mower Co.....	98	Freeport Bicycle Mfg. Co.....	81	Johns, H. W. Mfg. Co.....	16
Bogert, John L.....	63	Colliau, Victor.....	30	Frost Thill Spring Co.....	90	Johnson Foundry Co.....	27
Boker, Hermann & Co.....	19	Conroy, P. J. & Co.....	90	Fulton Iron & Engine Works.....	52	Johnson, I. G. & Co.....	108
Boone, W. C. Mfg. Co.....	29	Consolidated Steel & Wire Co.....	15	Gardner, Jas. & Son.....	28	Johnson, I. H., Jr., & Co.....	52
Booth, The Lloyd Co.....	28	Continental Iron Works.....	34	Garrison, A., Foundry Co.....	25	Jones, B. M. & Co.....	22
Borden & Lovell.....	11	Copeland & Bacon.....	53	Gartland Foundry Co.....	32	Jones, Jesse & Co.....	67
Borgner, Cyrus.....	28	Corning, Edw. & Co.....	17	Garvin Machine Co.....	58	Jones & Lamson Machine Co.....	64
Boston Bridge Works.....	16	Correspondence School of Mechanics.....	52	Gautier Steel Department.....	16&22	Kayser, Ellison & Co.....	19
Boston Gear Works.....	35	Cotton, Barclay W. & Co.....	17	Gaylord, F. L. Co.....	8	Keeley, Jerome & Co.....	18
Box, Alfred & Co.....	52	Coulter & McKenzie Machine Co.....	45	Gilbert & Bennett Mfg. Co.....	8	Kelley & Woolworth.....	74
Bradlee & Co.....	17	Coventry Machine Co.....	65	Glazier Stove Co.....	65	Kelly, Daniel.....	58
Bradley & Co.....	40&107	Covert Mfg. Co.....	90	Gleason Tool Co.....	32	Kennedy, Julian.....	31
Bradley Fertilizer Co.....	43	Covert's Saddlery Works.....	65	Goodell Co.....	76	Kesner, J. L. & Co.....	82
Brass Goods Mfg. Co.....	2	Cox, Justice, Jr.....	22	Goodell, J. W.....	60	Keyless Lock Co.....	88
Bridgeport Chain Co.....	78	Cramp, Wm. & Sons S. & E. B. Co.....	3	Goubert Mfg. Co.....	32	Keys, W. W. & R. M. Co.....	107
Bridgeport De-oxidized Bronze & Metal Co.....	3	Crescent Horse Shoe & Iron Co.....	92	Gould & Eberhardt.....	39	Keystone Clutch & Machine Works.....	49
Bridgeport Gun Implement Co.....	50	Crescent Phosphorized Metal Co.....	30	Goulds Mfg. Co.....	38	Keystone Mfg. Co.....	91
Briggs, Marvin.....	58	Crescent Steel Co.....	13	Graham, John H. & Co.....	79	Kilbourne & Jacobs Mfg. Co.....	96
Bristols Mfg. Co.....	1	Cresson, Geo. V. Co.....	43	Grand Crossing Tack Co.....	13	Kilmer Mfg. Co.....	7
Britton, Horace E.....	70	Croissant, M.....	87	Grant Anti-Friction Ball Co.....	44	King, J. M. & Co.....	73
Britton, J. Blodgett.....	30	Crosby, G. A. & Co.....	42	Grant Corundum Wheel Mfg. Co.....	54	Knap & Cowles Mfg. Co.....	90
Broderick & Bascom Rope Co.....	6	Crosby Steam Gauge & Valve Co.....	3	Green, A. H.....	94	Koch, A. B. & Co.....	68
Bronson Supply Co.....	86	Cross & Speirs Machine Co.....	51	Gurney, F. B.....	75	Kohler, F. E. & Co.....	98
Brown, E. E. & Co.....	91	Crown Smelting Co.....	3	Haight & Clark.....	27	Konigsloew, Otto.....	97
Brown Hoisting & Conveying Mch. Co.....	38	Cruikshank, D. B.....	67	Haines & Zimmermann.....	81	Krescher, B. & Sons.....	23
Brown, R. H. & Co.....	66					Krogsrud, W.....	72
Brown & Sharpe Mfg. Co.....	56					La Belle Steel Co.....	23
Bryden Horse Shoe Co.....	92					Lafin & Rand Powder Co.....	25
Buck Bros.....	75						

Lamberson, B.	60	New Haven Copper Co.	2	Ripley Mfg. Co.	90	Taylor Iron & Steel Co.	24
Lane Brothers.	88	New Haven Mfg. Co.	45	Riverside Iron Works.	24	The Audubon.	62
Lang Mfg. Co.	83	New Haven Wire Mfg. Co.	6	Roberts, A. & P. & Co.	20	Thomson Electric Welding Co.	24
Lansing Wheelbarrow Co.	97	N. J. Wire Cloth Co.	8	Roberts, Frank C. & Co.	30	Thomson-Houston Motor Co.	52
Lape, W. E.	99	New Process Twist Drill Co.	50	Roberts Mfg. Co.	38	Thomson, W. H. & Co.	18
Laughlin, Alex. & Co.	31	New Process Raw Hide Co.	45	Robinson-Rea Mfg. Co.	26	Tiebout, W. J.	89
Lea, J. Tatnall & Co.	23	Newton & Shipman.	19	Rogers, The Wm. Mfg. Co.	77	Titchener, E. H. & Co.	11
Lean, D. R. Co.	30	N. Y. Belting & Packing Co.	39	Rollason Gas Engines.	35	Tod, Wm. & Co.	34
Leavitt Machine Co.	70	N. Y. Machinery Depot.	57	Rouse-Duryea Cycle Co.	65	Toledo Bicycle Co.	81
Le Count, C. W.	92	N. Y. Mallet & Handle Works.	69	Rowland, Wm. & Harvey.	108	Toledo Block Works.	91
Leechburg Foundry & Machine Co.	20	N. Y. Powder Co.	25	Russell, Burdall & Ward.	108	Toomey, Frank.	58
Lefell, W. C. Co.	34	Niagara Stamping & Tool Co.	49	Russia Cement Co.	68	Torrey, J. R. Razor Co.	75
Le Massena, C. E. & Co.	54	Nicholson File Co.	72	St. Joseph Pump Co.	69	Totten & Hogg Iron and Steel Fdry.	
Leng's, Jno. S. Son & Co.	108	Nicolls, Wheeler & Co.	17	St. Louis Bronze & Aluminum Works	2	Co.	25
Leonard, B. E.	95	Niles Tool Works.	58	Sabin Machine Co.	4	Townsend, W. P. & Co.	100
Leonard, J.	22	North Bros. Mfg. Co.	18	Salem Foundry & Machine Shop.	52	Trenton Iron Co.	4
Leonard, T. F.	95	North Bros. Mfg. Co.	65	Salem Wire Nail Co.	13	Trenton Malleable Iron Co.	27
Leschen, A. & Sons Rope Co.	6	Northampton Cutlery Co.	76	Samson Cordage Works.	1	Threthewey Mfg. Co.	32
Levis, Henry & Co.	22	Northampton Emery Wheel Co.	54	Samuel, Frank.	17	Trimont Mfg. Co.	94
Lidgerwood Mfg. Co.	108	Northwest Malleable Iron Co.	26	Sands, Thomas.	61	Troy Nickel Works.	75
Lindsay, Jas. G. & Co.	18	Norton Emery Wheel Co.	54	Sargent Co.	28	Tuck Mfg. Co.	5
Link-Belt Engineering Co.	42	Norton & Jones Machine Tool Works.	38	Saunders's Sons, D.	46	Tucker & Dorsey Mfg. Co.	85
Lockhart Iron & Steel Co.	23	Norwalk Iron Works Co.	37	Scattergood, H. W.	63	Tudor Iron Works.	1
Lodge & Davis Machine Tool Co.	56&57	Nourse, Fred Cr.	5	Schaeffer & Co.	97	Tyler Wire Works Co. W. S.	64
Lodge & Shipley Machine Tool Co.	55	Noyes, B. B. & Co.	77	Scheeler & Sons.	6	Underhill, Clinch & Co.	74
Long & Allstatter Co.	42	Nubian Iron Enamel Co.	63	Schmitz, E. Lothar.	74	Union Fdry & Mch Co.	35
Loring, Chas. Carroll & Co.	107	Obermayer, S. Co.	29	Schneider & Trenkamp Co.	77	Union Mfg. Co.	48
Lovell, Jno. P. Arms Co.	81	Ogden & Wallace.	22	Schwarzenberg Bros. & Co.	62	Union Metallic Cartridge Co.	1
Lovell Mfg. Co., Ltd.	61	Ohio Lantern Co.	83	Scott, Geo. M.	46	Unity Door Check Co.	89
Lovell, Tracy & Co.	93	Oil Well Supply Co.	31	Scoville Mfg. Co.	2	Universal Sad Iron Co.	69
Lovegrove & Co.	58	Old Dominion Iron & Nail Works Co.	93	Seranton Forging Co.	92	Valentine, M. D. & Bro.	28
Ludlow-Raylor Wire Co.	7	Osborn, G. Edw. & Co.	34	Seranton Supply & Machine Co.	59	Valley Pump Works.	37
Lufkin Rule Co.	69	Ossawan Mills Co.	89	Seaman, Sleeth & Black.	25	Van Dorn Iron Works Co.	9
Lukens Iron & Steel Co.	17	Ostrander Fire Brick Co.	28	Security Warehouse.	11	Vanderbilt-Sash Balance Co.	89
Lundberg, Gustaf.	19	Ostrander, W. R. & Co.	94	Sellers, Wm. & Co.	53	Van Wagoner & Williams Co.	108
McCabe, J. J.	57	Otto Gas Engine Works.	35	Seneca Falls Mfg. Co.	52	Victor Mfg. Co.	89
McCaffrey File Co.	72	Oxford Iron & Nail Co.	11	Sessions Foundry Co.	26	Vulcan Iron Works.	25
McClure, Amsler & Co.	31	Packer, C. W.	65	Seyfert's Sons, L. F.	57	Wadhams Oil & Grease Co.	35
McCoy, Jos. F. & Co.	86	Palmer & De Mooy.	26	Shepard, Sidney & Co.	86	Wais & Roos, P. & S. Co.	44
McFarland, Wm.	4	Palmer Hardware Mfg. Co.	89	Shipman Engine Co.	35	Wallace, Wm. H. & Co.	22
McGowan, J. H. & Co.	37	Pancoast Henry, B. & Co.	47	Shubert & Cottingham.	91	Wardlow, S. & Co.	19
McIlvain, Wm. & Sons.	27	Parry Mfg. Co.	82	Shultz Belting Co.	1	Washburn & Moen Mfg. Co.	4
McKay, Jas. & Co.	18	Passaic Art Casting Co.	3	Sibbel, Geo. H. & Co.	58	Washburn Shops.	49
MacKellar Fdry. Facing & Supply Co.	29	Passaic Rolling Mill Co.	22	Sibley & Ware.	46	Waterbury Brass Co.	2
McKinney Mfg. Co.	87	Paxson, J. W. & Co.	29	Sickles, Sweet & Lyon.	73	Waterbury Farrel Foundry & Machine Co.	37
McLean, John.	37	Peabody & Parks.	85	Sidney Steel Scraper Co.	97	Waterbury Machine Co.	47
McLeod & Henry Co.	28	Peck, A. G. & Co.	108	Sigourney Tool Co.	44	Watson & Stillman.	43
McNab & Harlin Mfg. Co.	34	Pedrick & Ayer.	41	"Silver Finish"	5	Webster, Warren & Co.	33
Machinists' Supply Co.	58	Penna. Diamond Drill & Mfg. Co.	36	Silver Mfg. Co.	63	Weiland, Chas.	60
Mackay, Jas. T.	63	Pennsylvania Mch. Co.	57	Simonds Mfg. Co.	20	Wellman Iron & Steel Co.	17
Mahoning Foundry & Machine Shop.	24	Pennsylvania Steel Co.	21	Singer, Nimick & Co.	23	Wells Bros. & Co.	49
Mahoning Valley Iron Co.	22	Parkins, H. H. Mfg. Co.	98	Skelly, J. W. & Son.	90	West Cocksack Iron Fdy.	13
Main Belting Co.	39	Perry, W. H. & Co.	59	Skinner Chuck Co.	48	Western Wheel Works.	81
Mann, Edwin R. & Co.	18	Philadelphia Drop Forge Co.	27	Smith & Egge Mfg. Co.	48	Wetherell Bros. & Co.	19&23
Manning, Maxwell & Moore.	50	Philadelphia Engineering Wks.	30	Smith, H. D. & Co.	93	Wetherill, Robt. & Co.	107
Manville Machine Co., E. J.	55	Phillips, E. & Sons.	13	Smith, J. D. Foundry Supply Co.	29	Wharton, Jos. S. Lovering.	80
Manfield, H. H.	58	Phillips, Townsend & Co.	6	Smith Friction Drill and Tool Co.	49	White, L. & I. J. Co.	75
Maris & Beekley.	53	Phoenix Horseshoe Co.	93	Smith, Oliver A.	96	White Mfg. Co.	9
Maslin, J. & Son.	37	Phoenix Iron Co.	17	Smythe, S. R. Co., Inc.	31	White Mt. Freezer Co.	65
Mason Regulator Co.	107	Phoenix Iron Works Co.	36	Sommer's Son, John.	108	Whitlock Coil Pipe Co.	33
Mast, Foss & Co.	9	Phosphor Bronze Smelting Co.	3	Southwark Foundry & Machine Co.	35	Whitman & Barnes Mfg. Co.	72
Matthal, Ingram & Co.	1	Pickands, Brown & Co.	21	Speidel, J. G.	53	Whitney, A. R. & Co.	24
Matthiesen & Hegeler Zinc Co.	2	Pickerson & Co.	13	Speirs, J. C. & Co.	25	Whitney, A. & Sons.	22
Maurer, H. & Son.	28	Pike Mfg. Co.	54	Spencer's I. S. Sons.	27	Whitton, D. E. Mch. Co.	48
Mayhew, H. H. Co.	74	Pilling & Crane.	18	Springfield Brass Co.	37	Wickwire Bros.	7
Merrill Bros.	18	Pittsburgh I. & S. Eng. Co.	30	Springfield Emery Wheel Co.	54	Wilcox & Howe Co.	90
Merrill Mfg. Co.	46	Pittsburgh Mfg. Co.	42	Standard Fdry. & Mfg. Co.	27	Wild, A. L.	89
Merriman, A. H.	43	Pittsburgh Reduction Co.	64	Standard Horse Shoe Co.	92	Wiley & Russell Mfg. Co.	47&108
Miles, F. S.	13	Place, Geo.	57	Standard Steel Casting Co.	108	Wilkie, Bothwell & Co.	30
Miller & Van Winkle.	4	Plumb, Fayette R.	76	Standard Tool Co.	50	Williams, J. H. & Co.	94
Miller Lock Co.	89	Plume & Atwood Mfg. Co.	2	Stanley Rule & Level Co.	107	Williamson, C. T. Wire Nov. Co.	107
Millers Falls Co.	66&108	Plymouth Mills.	11	Stanley Works.	65	Williamsport Wire Rope Co.	6
Milne, A. & Co.	20	Pollock, W. B. & Co.	34	Stark Mch. & Tool Co.	43	Wilmot & Hobbs Mfg. Co.	1 & 3
Milton Mfg. Co.	99	Poole, Robt. & Son Co.	36	Starrett, L. S.	53&73	Wilson, E. H. & Co.	18
Miner & Peck Mfg. Co.	44	Pope Mfg. Co.	65	Steam Gauge & Lantern Co.	80	Wilson, John.	74
Mohr, J. J.	18	Popping, J.	49	Stearns, E. C. & Co.	64	Wilson, J. Fred.	100
Moline Elevator Co.	51	Port Chester Bolt & Nut Co.	98	Steel & Iron Improvement Co.	64	Wilson, W. A.	43
Monce, S. G.	72	Portsmouth Wrench Co.	90	Steptoe, J. & Co.	59	Winslow, Sm'l, Skate Mfg. Co.	80
Montour Iron & Steel Co.	22	Pottstown Iron Co.	20	Sterling Emery Wheel Co.	54	Wire Goods Co.	6
Moore, Dr. Gideon E.	52	Pottsville Iron & Steel Co.	17	Sternbergh, J. H. & Son.	100	Wister, Francis.	27
Moore Mfg. & Foundry Co.	64	Powell Planer Co.	43	Stevens Arms & Tool Co.	79	Wister, L. & R. & Co.	22
Moore & White Co.	53	Pratt & Whitney Co.	49	Stewart & Baker.	89	Witherow, Jas. P. Co.	32
Moore & Wickert.	97	Prentiss, Geo. W. & Co.	9	Stiles & Parker Press Co.	40	Wolcott & West.	62
Moorhead-McCleane Co.	23	Prentiss Tool & Supply Co.	57	Stocking, E. B.	6	Wolff, R. H. & Co. Ltd.	5
Morgan Construction Co.	4	Prentiss Vise Co.	68	Storm Mfg. Co.	70	Wollensak, J. F.	72&91
Morgan Spring Co.	4	Pullman, J. Wesley.	23	Stover Novelty Works.	46	Wood, Alan & Co.	18
Morrison, Robert.	32	Pullman Sash Balance Co.	89	Stover Mfg. Co.	90	Wood, R. D. & Co.	27
Morse Twist Drill & Machine Co.	50	Q & C Co.	11	Stover Flexible Shaft Co.	50	Wood, W. Dewees Co.	23
Morse, Williams & Co.	53	Queen Anne Screen Co.	90	Stow Mfg. Co.	50	Woodruff Mfg. Co.	51
Morton Mfg. Co.	41	Quint, A. D.	45	Stuart & Peterson Co.	85	Worcester Mch. Screw Co.	100
Morton, Thos.	88	Rainey, W. J.	1	Sturtevant, B. F. Co.	45	Worthington, Henry R.	37
Moseley Iron Bridge & Roof Co.	11	Rand Drill Co.	36	Supplee Hardware Co.	98	Wrenn, Whitehurst & Co.	60
Motley, Peter.	90	Randolph & Clowes.	1	Sweatt Mfg. Co.	96	Wright & Colton Wire Cloth Co.	8
Mount Carmel Bolt Co.	107	Read, Wm. & Sons.	107	Sweetser, W. A.	30	Wright, Peter & Son.	78
Myers, F. E. & Bro.	73	Reading Hardware Co.	88	Swindell, W. & Bros.	31	Wrought Iron Bridge Co.	15
Myers, H. M. Co.	93	Reeves, Paul S.	108	Syracuse Specialty Mfg. Co.	92	Wurster, F. W. & Co.	108
National Horse Nail Co.	93	Reily, J. W.	18	Taintor Mfg. Co.	97	Wyman & Gordon.	27
National Pipe Bending Co.	33	Reliance Wire Wks Co.	8	Tablet & Ticket Co.	63	Yale & Towne Mfg. Co.	52&67
National Saw Co.	70	Reynolds & Co.	11	Talcott, W. O.	39	Zucker & Levett Chem. Co.	32
National Screw & Tack Co.	12	R.I. Perkins Horse Shoe Co.	92				
Naylor & Co.	22	Rice, C. F.	61				
Newark Machine Tool Works.	64	Richards, D. W. & Co.	59				
New Castle Wire Nail Co.	18	Richardson, C. F. & Son.	69				
New Doty Mfg. Co.	53	Ridgway, Craig & Son.	51				
		Riehl Bros. Testing Machine Co.	41				

BRADLEY HAMMERS.

If you plate, draw, square, taper, swage, collar, spindle or do any manner of die forging in iron or steel, a Bradley Hammer will soon pay for itself by what it will save over any other similar tool. Send for circulars.

BRADLEY & COMPANY, Syracuse, N. Y.

1893 MAJESTIC BICYCLE.

STANDARD HIGH GRADE. REDUCED TO

\$85.00.

Pneumatic Tire. No Better Wheel Made for the Hardware Trade.

MANUFACTURED BY

HULBERT BROS. & CO., 26 W. 23d Street, Opp. 5th Ave. Hotel, NEW YORK.

WHEN IN NEED Address MOUNT CARMEL BOLT CO.,
MOUNT CARMEL, CONN.



WILLIAMSON'S POWER CORK SCREWS.

Turns the Cork out of the bottle.

For Prices and other styles send for Catalogue.

C. T. WILLIAMSON WIRE NOVELTY CO.,

NEWARK, N. J.

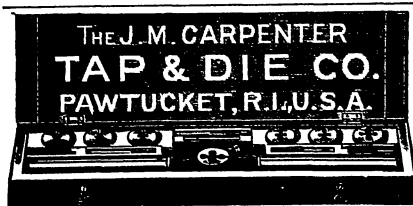
Manufacturers of Wire Specialties for the Trade.

THE W.W.&R.M. KEYS CO.
BRIDGEPORT, CONN.

Bronze, Composition and Brass Castings,
Ingots, Etc.

ALSO MANUFACTURERS OF

BABBITT METALS.



OFFICE OF
CHAS. CARROLL LORING & CO.,
AUCTIONEERS.

EXPERTS, CATALOGUERS, APPRAISERS.

SPECIAL BRANCH:
MILLS, TOOLS, MACHINERY AND MERCHANDISE

272 Franklin St., Boston, Mass.

Sell all over the U. S. Correspondence Invited.

Key to Steam Engineering.

Embracing important questions answered
concerning the steam engine
and boiler.

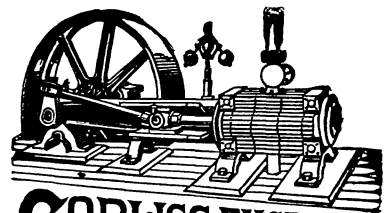
By H. S. WILLIAMS.

174 Pages, 18mo, Cloth, - \$1.00.

Sent post-paid on receipt of price by

DAVID WILLIAMS, Publisher & Bookseller,

96-102 Reade St., New York.



CORLISS ENGINES
MACHINISTS
IRON FOUNDERS, BOILER MAKERS,
ROBT. WETHERILL & CO.
CHESTER, PA.

NEW MAIL.

10th Year 1893 Model.



SPECIALLY ADOPTED BY
the HARDWARE TRADE.

CUSHION TIRES, - \$105.00.

PNEUMATIC TIRES, - 125.00.

Men's, Ladies' and Boys' Patterns.

SECURE AGENCY.

Also our line Cheap Wheels—The Best.

MANUFACTURERS:

WM. READ & SONS,
107 WASHINGTON ST., BOSTON, Mass.

AMERICAN WHIPS

If you sell whips send for price on 10 Americans, our special assortment for hardware dealers. A complete line in one lot.

AMERICAN WHIP CO.,
WESTFIELD, MASS.

A FEW YEARS' USE

prove the quality of valves more effectually than all the arguments of the salesman. The **Mason Regulator Co.**, of Boston, can refer intending purchasers of valves to parties who have used their goods for years.

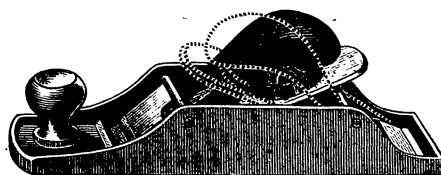
IMPROVED
Labor-Saving
CARPENTERS'
TOOLS.

STANLEY
RULE & LEVEL CO.

New Britain, Conn.

SOLD BY ALL
Hardware Dealers.

Double-Ender Block Plane



This Plane has two slots, and two cutter seats. It can be used as a Block Plane; or, by reversing the position of the cutter and the clamping wedge (see dotted lines in the engraving), it can be used to plane close up into corners, or places difficult to reach with any other plane.

No. 130. Block Plane (Double-Ender), 1 1/4 inch Cutter, \$0.80

W. & E. T. FITCH,
NEW HAVEN, CONN.
Manufacturers of a variety of
HARNESS SNAPS.



This Cut represents the
UNION PAT. BOLT SNAP.

PAUL S. REEVES,
Philadelphia.
Phosphor Bronze

AND
BABBITT METALS.

Lead Lined Car Bearings a Specialty.

Brass and Phosphor Bronze Castings from $\frac{1}{4}$ pound to 20,000 pounds in weight.

STANDARD STEEL CASTING CO.
THURLOW, PA.
STEEL CASTINGS
QUALITY EQUAL TO STEEL FORGINGS

ESTABLISHED Spring Making, 1842. Steel Making, 1845.
Norway Iron, 1871 (Re-Rolled).

WM. & HARVEY ROWLAND,
MANUFACTURERS OF

Springs, Steel, Re-Rolled Norway
Iron & Slit Norway Nail Rods.

Address FRANKFORD P. O., PHILADELPHIA.

BURGESS & LOXLEY,

Malleable Iron and Small Steel Castings

MILITARY ROAD & CHANDLER STREET.
BUFFALO, N. Y.

DAYTON
MALLEABLE
IRON CO.
DAYTON, O.
HIGH CLASS
CASTINGS A SPECIALTY.

The Iron Age Hardware Price Book E.
WITH MULTIPLE INDEX.

7 x 10 inches, 350 pages, flexible seal grain leather, with pocket; Crane's heavy ledger paper, \$5.00.

Sent postpaid upon receipt of price.

DAVID WILLIAMS, 96-102 Reade St., New York

BUFFALO
BLOWERS
FOR CUPOLAS, FORGES,
FURNACES & EXHAUSTERS
STEAM FANS, HEATERS &
VENTILATING WHEELS
BUFFALO FORGE CO.
BUFFALO, N.Y.

STANLEY G. FLAGG & CO., Philadelphia, Pa.
Office and Works, N. W. Cor 19th St & Pennsylvania Ave.
Manufacturers of **STEEL CASTINGS,**
A Substitute for Steel and Wrought Forgings.
Circulars Sent on Application.

POWER HACK SAW.

See Page 66.

MILLERS FALLS CO.

93 Reade St., New York.

EUREKA CAST STEEL COMPANY.

Office and Works, Chester, Pa.
Open Hearth, Crucible and Eureka Steel Castings.
Railroad and Machine Castings.
Locomotive Cross-Heads and Gearing a Specialty.
Guaranteed Knuckles for M. C. B. Couplers.

SPRINGS AND AXLES
ROLLING MILL.
F. W. WURSTER & CO.
375 Kent Ave. Brooklyn N.Y.

New Full Mounted
Lightning Screw
Plate.
Send for Catalogue.



WILEY & RUSSELL MFG. CO., - Greenfield, Mass.

STEEL TUBES
WELDLESS
JOHN S. LENG'S SON & CO. NEW YORK.

LIDGERWOOD
HOISTING ENGINES.

300 styles and sizes. Over 9500 in use.

LIDGERWOOD MFG. CO., 96 Liberty St., N. Y.

JOHN SOMMER'S "FEARLESS" FAUCETS
BEST BLOCK TIN KEY,
HIGHLY POLISHED
MAPLE WOOD BODY
ONLY THE GENUINE ARE STAMPED
IN THE WOOD WITH TRADE MARK
WITH TRADE MARK
AS PER CUT
BEWARE OF IMITATIONS
SUCH AS FAUCETS SIMILAR
IN SHAPE TO THE
LEAD
JOHN SOMMER'S SON, MFR, 8-12 PEARL ST, NEWARK, N.J.

EXPERIMENTAL ELECTRICITY.

By EDWARD THEVERT.

Illustrated. - Cloth. - \$1.00.

CONTENTS—Some Easy Experiments in Electricity and Magnetism; How to Make Electric Batteries; A Galvanometer; An Induction Coil; An Electric Bell; A Magneto Machine; A Telegraph Instrument; An Electric Motor; A Dynamo; Electric Bell Fitting and Gas Lighting; Electric Lamps; Electric Terms.

DAVID WILLIAMS, Publisher & Bookseller,
96-102 Reade St., New York.

RUSSELL, BURDSALL & WARD,
Portchester, N. Y.,
Manufacturers of
Carriage, Tire, Plow and Stove
BOLTS

Carriage Bolts made from Best Square Iron a Specialty.

Solid Steel Castings

From Crucible and Open Hearth.

Steel and Gun Metal Rolls
Specialties.

Air Furnace Refined
Malleable Castings.

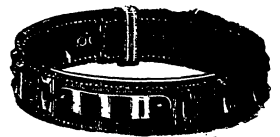
ISAAC C. JOHNSON & CO.,

ESTABLISHED 1853,

SPUYTEN DUYVIL, NEW YORK CITY.

DOG COLLARS,
DOG MUZZLES.

THE
CHAPMAN
MFG. CO.,
Meriden, Conn.



A. G. PECK & CO.
Cohoes, N. Y.

MANUFACTURERS OF

AXES, ADZES
BROAD AXES,
HATCHETS.

Send for Catalogue and
Price List.



CASTINGS.

Light Machine and
small gray iron castings of superior quality. We have exceptional facilities for producing fine work.

Prices reasonable.

VAN WAGONER & WILLIAMS CO.

Cleveland, Ohio.

Published by DAVID WILLIAMS, 96-102 Reade Street, New York. Printed by THE WILLIAMS PRINTING CO., General Book, Commercial and Newspaper Printers and Binders, Nos. 96-102 Reade St. New York.

THE IRON AGE

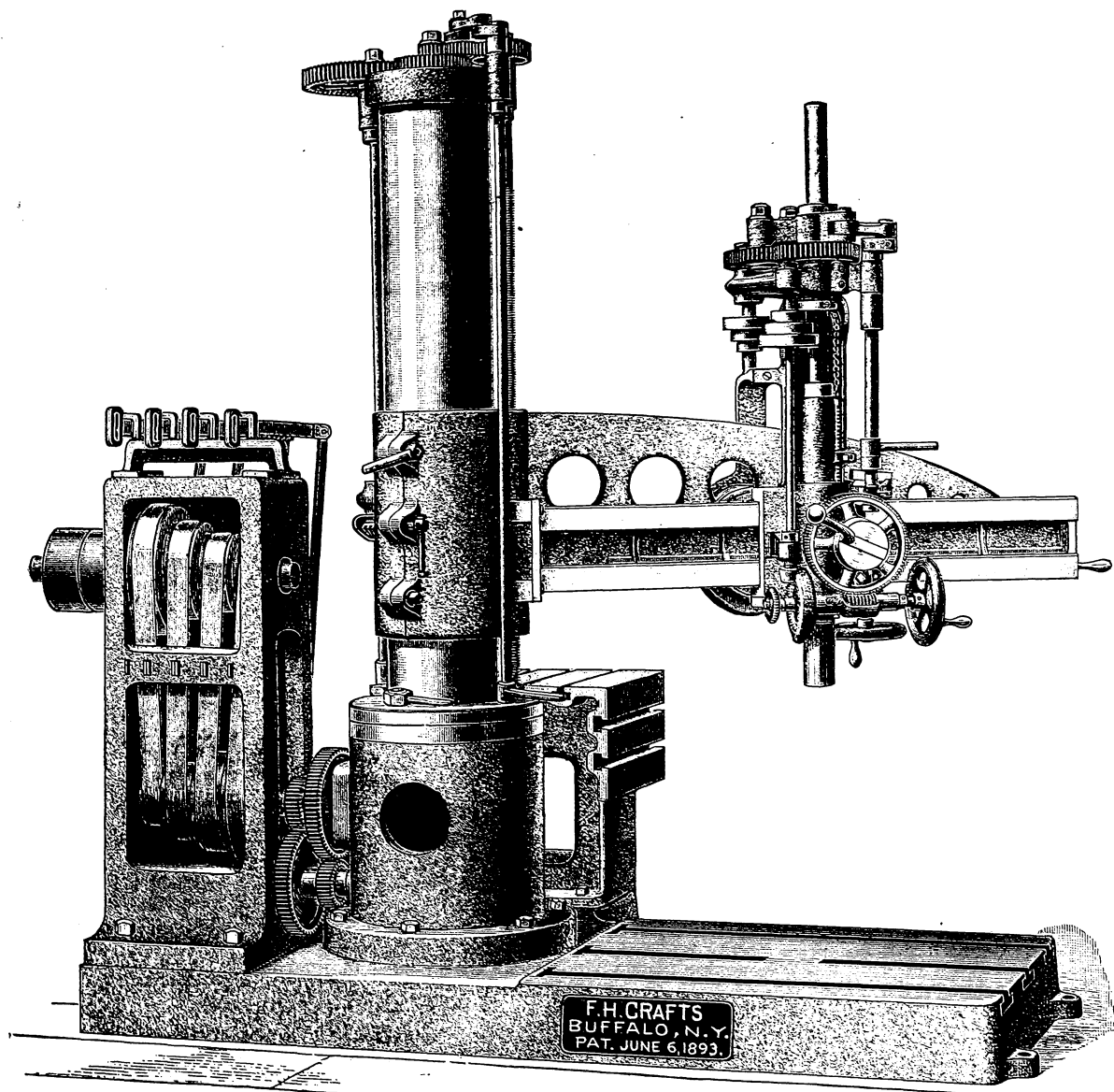
THURSDAY, JULY 13, 1893.

The Crafts Radial Drill.

The most important feature of this drill, which is built by F. H. Crafts of Buffalo, N. Y., is to be found in the method employed to obtain the several changes of speed required in machines of this type. The changes from the fastest to the slowest speed can be made instantly, and any tension of the belt

vided with automatic feed. Either a box or tilting table is provided. All the shafts, spindles, worms and worm rings are made of steel, and all gearing is cut from the solid and the main gearing is made of steel. The principal dimensions of the No. 1 machine are: Diameter of column, 10 inches; distance from floor to highest point of column, 7½ feet; distance from elevating screw to center of drill spindle when at the

under which the Edison Electric Illuminating Company are sole licenses in the city of New York. The injunction is suspended in its operation for ten days to enable the hotels in question to obtain other means of illumination. These cases were the first that have been brought against users of the Edison lamp patent as distinguished from manufacturers, and the decision is far-reaching in its effects. It is of



THE CRAFTS RADIAL DRILL.

can be secured to carry the lightest or heaviest load. This is accomplished by the employment of four endless belts, each of which is provided with a tightener. These tighteners are controlled by a series of levers, having notches planed in them at intervals of ¼ inch. This enables the operator to make rapid changes and to almost double the capacity of the drill. The general arrangement of the belts is shown at the left in the engraving. The drill is made unusually heavy in all its parts. It has power raising and lowering attachment, the drill spindle has quick return, is counter-weighted and pro-

extreme point of the arm, 3 feet 7 inches; vertical range of arm on the column, 2½ feet; receives under spindle over base, 4 feet 2½ inches; receives under spindle over floor, 4 feet 9½ inches; traverse of spindle, 15 inches; floor space occupied, 4 feet 7 inches by 7 feet 4 inches; weight, 4500 pounds.

Judge Lacombe of the United States Circuit Court, on July 1, granted injunctions to the Edison Electric Illuminating Company of New York against the Holland House and the Hotel Imperial, prohibiting them from using incandescent lamps infringing the Edison patent,

great importance, especially in view of the recent refusal of an injunction by Judge Hallett in St. Louis against a Western manufacturer. The decision will be regarded as a rule for all users of other than Edison lamps in the States constituting the second circuit, and other suits will be immediately brought against other users similarly situated. The decision will doubtless secure to the Edison Electric Illuminating Company the incandescent lighting business in New York City, and go a long way toward securing to similar licensees the same privilege in other cities.

The Foundrymen's Association.

The regular monthly meeting of the Foundrymen's Association was held at the Manufacturers' Club in Philadelphia on Thursday, July 6, Thomas Devlin of Thos. Devlin & Co., Philadelphia, occupying the chair in the absence of the president. The attendance was not so large as at previous meetings.

The minutes of the last meeting were read and adopted.

The Executive Committee reported that at its last meeting some discussion took place in regard to the circular recently issued by the association to other associations formed and forming, and it was finally arranged to await answers from all points, no action in the meantime to be taken and no departure from the usual proceedings of the association to be made. It was desirable, however, that the association should help other bodies in any way possible calculated to benefit the foundry trade all over the country. As to the state of trade, the report stated that almost every foundry had taken steps to reduce the cost of production, although the price of labor remained the same as for years and was an important factor in the case. It seemed as though something should be done to make both ends meet at the end of the year. At the low price of castings in the open market it would seem that the only remedy would be a reduction in the cost, or a higher price for the products. The committee invited discussion upon the report.

The Special Committee, which includes the Price Committee, then reported by sections. P. D. Wanner of the Mellert Foundry & Machine Company of Reading, Pa., representing the iron-pipe trade, reported that in that line the trade was holding its own very well under the present condition of affairs in the country. Pipe foundries, so far as he knew, were pretty well filled with orders, and were particularly pressed on some sizes of pipe. Prices remained about the same, although they may have run a little higher occasionally on sizes for which there was not a usual demand, but in general the prices were not as good as the demand would warrant. He supposed the condition was in keeping with everything else at the present time. Everybody seemed afraid to ask anything like a fair price or profit for their productions. A year of low prices would seem to be ruling very generally. In the East founders were a little timid on account of the Southern pipe makers. The condition of the market in the East might have warranted an advance in prices, but the life was knocked out of the trade by the low prices at which Southern founders were offering. Pipe was being delivered all through the East as far as Bangor, Maine, by Southern pipe founders, and in some points it had been offered at prices at which Eastern founders could not begin to produce. This competition, he said, of course tended to promote timidity, and sales were being made bearing the smallest possible profit in order to keep foundries going and men employed.

E. E. Brown, of E. E. Brown & Co. of Philadelphia, representing the sash weight section of the committee, in reporting for his section said that he was glad to say that a little improvement was noticeable, but there was still room for a large improvement, particularly in

the New York market. In the Philadelphia and New England markets prices were fairly good, he might almost say profitable. In the New York market they were, if anything, lower than before.

Stanley G. Flagg, Jr., of Stanley G. Flagg & Co. of Philadelphia, representing the malleable iron castings section of the committee, had nothing to report. The trade was in bad shape and there had been no change of late.

R. A. Register, of Register & Sons, Baltimore, representing the cast iron soil pipe section of the committee, reported that the demand for stock continued good. He said that in view of the high quality of soil pipe required for the Philadelphia trade in order to comply with the sanitary regulations, an arrangement had been arrived at between the manufacturers for the purpose of elevating the standard of their respective manufactures. The arrangement came to will go into effect at once and necessitates an advance in prices.

The Riehlé Bros. Testing Machine Company were elected to membership in the association.

The secretary announced that Dr. Kirk, who had arranged to be present at the meeting and deliver an address on the subject of "Melting and Fluxing in Cupolas" had not appeared, and his absence was unexplained. There was present, however, Wm. C. Henderson, chemist for Thos. Devlin & Co., who would address the meeting on a subject of interest to all present. Mr. Henderson then addressed the meeting on the subject of

Chemistry as Applied to the Iron Foundry Industry.

He said: I have been requested to address you this evening upon the subject of "The Value of the Chemist's Services as Applied to the Iron Foundry Industry."

The methods employed by the chemist in arriving at conclusions are so imperfectly understood by the laity that the manufacturer of the cruder products of iron is not always in a position to decide whether their adoption would be of advantage to him or not. I qualify the statement in this way, because in the higher branches of iron and steel making the chemist's position is of such recognized importance as to render impossible all thought of operating without him. I am persuaded that in the case of many foundrymen there exists a strong prejudice against any departure from their time-honored manner of running their foundries, which predisposes them to regard the work of the chemist as being an expensive theoretical nicety incapable of practical results of the character in which they deal. It would be well before passing judgment for each foundryman to ascertain just what the chemist can do, how he does it, and whether the same ends may be achieved in any other way. Investigation will show that in forming his deductions the chemist's mode of procedure is singularly simple, reasonable and practical. As a result of years of exhaustive scientific experiment, theory and actual practice, the records of which are most complete and voluminous, it is known that certain impurities in material produce certain characteristic effects upon the physical behavior of manufacture resulting from its employment, that certain combinations of impurities produce certain other effects, and that in the process of conversion, which is in every case a chemical one, these impurities may be eliminated, retained or forced into com-

bination with others according to fixed laws and conditions to which they are subject.

I use the word impurities in its strict scientific significance, and it is not to be supposed that their presence is in every instance objectionable; for while the existence of some is attended with wholly injurious results, and the abnormal content of any is productive of pernicious consequences, it is at the same time due to the properly adjusted proportions of others that desirable requirements are met that would otherwise be impossible. To properly adjust these proportions to effect the physical constitution demanded in the final product calls for ability of the highest order; for the line, on either side of which an element may not enter into its composition without disaster, is not always clearly defined. The influence exerted by other elements present, in neutralizing or augmenting properties identical to one, and the modified reactions occasioned by a change of conditions—such, for instance, as conducting the operations in newly lined vessels—are mere hints as to difficulties presented; and it is in the solution of this problem that the chemist's capacity is unique; for equipped with this knowledge he proceeds to determine, with absolute accuracy, to what extent these impurities exist in the material at his disposal, and he causes at will their ultimate dispensation in accordance with the physical end toward which his efforts have been directed. This undertaking is, indeed, so formidable that one may well pardon, in those not familiar with the possibilities in the manufacture of the higher grades of iron and steel, skepticism as to its achievement. A glance, however, at the specifications to which the metal used in the construction of our nation's ordnance must conform will dispel any doubt in the matter, and this is but an instance of requirements the every-day fulfillment of which is made possible by the work of the chemist.

To the iron founder, perhaps, among the more direct and comprehensive advantages that would follow the employment of a chemist would be his ability in the purchase of material; to intelligently take advantage of low prices, and in only acquiring such as would be best adapted to his purpose; to tell whether or not he could make use of a material and what results would take place in the event of its use—and this, be it remembered, before the material in question is even purchased; to exactly reproduce physical qualities in manufacture, without using any of the original material, and in affording protection generally to the founder against deception; for, under the chemist's inspection, it does not suffice that certain material should have a good reputation simply, it following, of necessity, that such material must stand upon its intrinsic merit. Occasions are not wanting where imposition has been practiced in furnishing material of good quality until the reputation of the brand is fairly well established, when material of an inferior nature has been substituted.

Any attempt of this kind, where the material is subjected to chemical examination, would result in instant detection. I include under the general head of "material," pig iron, iron scrap, fuel, brick, clay, sand, oil and in fact everything used about a plant that is liable to any variation from a fixed standard or in which certain qualities are desired. In enumerating the many advantages

accruing to the iron founder from the employment of a chemist, it is presupposed that the work is in the hands of one who is in every way qualified and experienced, and who embraces also a thorough knowledge of metallurgy; that an unstinted equipment of the necessary apparatus, &c., is furnished him; that every reasonable facility is afforded him to properly carry forward his work, and that due attention is given to physical as well as to chemical testing, for it is only in their joint application that the full value of the chemist's work is realized in its entirety.

A word touching the relative value to the iron foundryman of physical as compared with chemical testing may not be out of place here. It must be obvious to all that the actual service to which manufacture is put when occupying the position for which it was made, constitutes the most complete physical test that it is possible to conceive, and as the chemist's knowledge has, in the first place, been derived from, and his sole aim is, in the last place, to meet, this test, it might be said that he is wholly independent of any system of tests other than chemical ones, and it could be so said with truth so far as present knowledge is concerned. But as the limit to learning has not yet been reached it is as an aid in advancing his information into unknown fields that physical testing is most essential to him; though of course, it is of great importance in checking his work. But what of permanent avail is accomplished by the application of physical tests to material the chemical composition of which is unknown. The very utmost that can be hoped from such tests is to establish the fact that a definite lot of material in hand is either good or bad. But absolutely nothing has been gained toward the estimation of future lots, every parcel of which has to be heated in the same aimless way, whereas a fact once established by chemical research remains fixed for all time. When it is known that a certain percentage of an element in a material under certain conditions produces a certain physical effect, every time these conditions are reached in this material having the same percentage of the element this identical physical effect is obtained and no other.

Some may argue that, because in supplying at a profit manufacture to the satisfaction of their customers, there exists no need for a change in their business policy. This sort of reasoning, aside from its inconsistency with the progressive spirit of the times, by no means shows that their output is the best that could have been produced at the same cost. That their customers are satisfied may simply be the result of their ignorance as to higher possibilities in such manufacture, and enlightenment in this matter will, doubtless, bring with it a corresponding loss of custom. The various shifts practiced by the iron foundryman with a view to estimate the value to him of certain material appear grotesque in comparison with the methodical system employed by the chemist, and I believe that very little is attempted beyond the testing of pig iron. In this instance the custom seems to be to charge a new iron, and if the resultant castings look all right the iron is considered good and is put on the list of good irons; but should the entire work of the molder be destroyed and a lot of metal to be remelted be the outcome, then the iron is regarded as bad, and that brand is to be ever after avoided.

This very often causes gross injustice

to be done to the pig iron producer, for if it proves anything at all it simply shows it with relation to that particular lot of iron used, it being quite possible for the iron from the same furnace to be at one time in every way suitable for a certain purpose and at another totally unfit for use in like manner. But I go so far as to say that whatever the outcome of this test it need not necessarily prove anything at all; for in event of a satisfactory result by this test from the use of a certain iron, it is possible that the iron in question might still be such as would be unsuited to the founder's peculiar purpose, but has, in the process of melting, neutralized the effect of another iron in the mixture equally as undesirable from an opposite cause, and the effect has been due to mere chance, and *vice versa*.

It must be within the experience of every foundryman that dire results have taken place, even though he was using material with which he thought himself perfectly familiar and for which he is perhaps unable to account even to this day. He should bear in mind that impurities in his fuel and other material besides pig iron play a most important part in his operations; and, although these have not entered into his calculations, such failures may be directly attributable to their abnormal existence. Many foundrymen are wont to lay great store by a name, and certain brands of iron are known to them as good irons or bad irons; indeed, in some cases a particular brand of iron is believed by them to be absolutely essential in the manufacture of their castings. Certain wily pig-iron men practice upon this delusion and obtain \$1 or \$2 more per ton for their iron than it could be advantageously replaced for by a vastly superior article.

The fallacious nature of the belief that because an iron of a certain name has at one time given good results the same good results will always follow its future use, will appear when it is known that the variation, in even the same cast of pig iron, is sometimes considerable. Pig irons are commonly spoken of among foundrymen according to some physical quality which they possess, such as "soft," "strong," "tough," &c. They do not know what causes these irons to possess these physical qualities, but, by their demand for them have forced the pig iron producer to learn the cause, and in his effort to meet this demand have rendered the presence of the chemist at the blast furnace of almost universal necessity. At the mines he is indispensable, because the ore is sold according to the percentage of iron or other metal contained, and its freedom from deleterious impurities has considerable bearing upon its value. That he is not in more general demand among iron foundrymen would seem to speak well for the hitherto profits in the business, but as each year brings with it a demand for lower prices it is only a question of time when the manufacturers in this important industry cannot afford to make needless mistakes, and the chemist's identity with the iron foundry will be assured.

In each progressive step advanced in the development of iron, from its first imperfect reduction from its ores to the production of the nickel-steel armor plate which causes to crash into harmless fragments projectiles hurled with the most destructive force of which man is at present capable, chemistry has played a part second to none. In a word, every change that comes over iron in passing from one state into

another is a chemical reaction, and to whom could its conduct be better intrusted than to the chemist?

At the conclusion of the address Mr. Henderson was tendered the thanks of the meeting.

Walter Wood of R. D. Wood & Co. of Philadelphia said it had always been a puzzle to him why chemists were not more useful to iron founders. Not that the iron founder was ignorant, but because of the elements or impurities to be found in pig iron. Founders remembered an iron that had plenty of phosphorus in it or a large amount of manganese or sulphur, and they avoided it. What they required was a No. 1 pig iron carrying a certain amount of carbon and silicon. In running a blast furnace the first three elements were elements which largely controlled the furnaceman's operations. The questions of carbon and silicon, elements which a foundryman mostly depended on, were conditions which a blast-furnaceman could not closely guarantee. Besides the assurance that there was no sulphur or other product deleterious to manufacture in the iron, it should be shown exactly what was the silicon and carbon in it in order to enable the foundryman to handle the metal carefully and understand it. To employ a chemist in a foundry without such assurance from the blast-furnaceman meant an analysis of almost every cast and every carload. Foundrymen were in the habit of judging as to the carbon by the color, and probably thus came to the conclusion that a chemist was not as useful as he might be, and trusted to the mixing of three or four different irons to strike an average, letting the mixer reduce that average to as near a certainty as possible. He would be glad to be corrected and have some light thrown on the question.

Mr. Henderson, in reply, said that a chemist could make any grade of iron desired, accidents excluded. The question of shrinkage was the main question a foundryman had to deal with. If the melting point of wrought iron was compared with the melting point of cast iron there would be found a marked difference in the number of degrees of heat necessary for the melting. It should first be ascertained what occasioned that tremendous difference, and a chemical analysis would reveal the fact that one was almost pure iron while the other contained what might be termed impurities. It was fair to suppose that the impurities were the cause of the change in the melting point. Certain impurities were found to be deleterious, such, for instance, as manganese, sulphur and others. In fact they would be objectionable unless handled with great care. Silicon had the effect of correcting shrinkage, for the reason that it had been ascertained that the purer the iron the greater the amount of heat required to melt it. It was a natural law that all bodies contract on cooling and expand on heating, consequently the greater the heat the greater the expansion. The farther apart the atoms of metal get when in a melted state the greater distance they had to come together in cooling. This was shrinkage. If the temperature of the metal could be reduced to the smallest possible degree and the metal held in fluidity, then would be reached the highest point from which shrinkage was to be ascertained, and in consequence the chemist selects an addition to the mixture considered to be the least deleterious to effect a reduction in the melting point of his metal. If he goes too far and uses too much silicon he

causes the article manufactured to be extremely brittle. Silicon has a tendency, when existing in high proportions, to make an article of low tensile strength, therefore it is necessary to know how far to go when using it.

P. D. Wanner thought that it was generally believed that the pig iron of the present day was not as good as it was 10 or 15 years ago. That was the opinion prevailing at Reading. Producers were careless as to the quality of ore melted and were forcing their furnaces with the object of turning out as large a quantity as possible without regard to quality, on account of the low prices current. This being the case, it became more important for the foundryman to mix his iron or to get to understand his iron so as to bring about good results. Silicon was very necessary in the iron used for making pipe, particularly in the larger sizes, so as to prevent undue shrinkage, and it could not be dispensed with. Iron possessing a good deal of that element was required. Too much caused the pipe to become brittle and thus entail a great deal of trouble, as he knew by experience. He had had trouble with a certain brand of iron which ran hard and white. He would like to know what was wanting in that case.

Several things, Mr. Henderson said, would cause iron to run white, sulphur having a remarkable effect. Sudden cooling would also cause the condition. It was likely, too, that the iron was low in graphitic carbon and high in combined carbon. Change in the temperature in melting when the iron contained a small amount of graphitic carbon would cause it to run white.

Mr. Wanner presumed that to meet the case it would be necessary to add another iron to the mixture sufficient to supply the deficiency existing.

Stanley G. Flagg, Jr., said that he had long intended to raise the question among members of the association as to whether it would be practical or possible for the association to go more fully into the technical part of the foundry business. He could not imagine a man melting a small heat of iron affording to employ a chemist. In Germany, foundrymen's associations such as this have technical connections. They sometimes employed a molder of large experience, and members requiring advice paid him for it at a rebate on fixed charges. In that way small consumers derived much benefit from the associations not otherwise available to them. If the membership in this association would combine and carry out a line of investigation it would prove very beneficial to all, and would result in information not open to individual members.

Mr. Wanner had no doubt the Executive Committee would be glad if the association would give the subject some thought. To have some one in the interests of the Foundrymen's Association to whom members with business large or small could turn for information was an idea worth following out. He supposed it would require something in addition to the ordinary fees of members to attain this end, but as one of the Executive Committee he should be glad to see what could be done.

After much discussion the matter was referred to the Executive Committee.

Mr. Wanner then stated that the Chamber of Commerce in New York, at a sitting that afternoon, had taken action in favor of the repeal of the Silver bill. A resolution, he said, was also passed that all boards of trade, industrial and commercial associations be

asked or requested to take up the matter and express their views on the subject. He was of the opinion that the Foundrymen's Association had secured a very good foothold, and he saw no reason why its members should wait until they were asked to act in the matter, or why they could not, to some extent, take the lead in that direction. He thought they should help the matter along. Doubtless, all were rejoiced to know that Congress would meet in August, instead of September. It was obvious that they were passing through a crisis which had already hurt a good many of them, and the end had, possibly, not yet been reached. The general opinion prevailing appeared to be that the Sherman silver law was a bad law and had induced the present condition of financial affairs, and, therefore, the sooner it was repealed the better it would be for all. He submitted the following resolution:

Resolved, as the sense of this association, That we respectfully urge upon Congress, when assembled, the immediate and unconditional repeal of the silver-purchasing clause of the Sherman act.

After some discussion, the resolution was put to the meeting and carried unanimously.

A motion was then made that the resolution be sent to the Speaker of the House under the seal of the association and the signature of its authorized officers.

The secretary, Howard Evans, announced that the Western Foundrymen's Association held their first meeting in Chicago on May 25 last. The association was permanently formed and was following very closely the proceedings of this association. In regard to the circular sent to them inviting discussions and comparisons on subjects of interest to foundrymen in general, he was advised that the new association would be carried on separately and on its own basis, but would feel itself in touch with this association and be perfectly willing to send information on any subject which it was in their power to give. He had written their secretary stating that this association was national in character and both willing and anxious to help any association in the United States, with the idea of furthering the interests of the foundry trades. If after a time all the associations were found to proceed satisfactorily it might be found desirable to have a meeting on a large scale.

The meeting then adjourned.

The naval gun cotton factory, recently burned down at Newport, will probably be rebuilt. Gun cotton is the high explosive of our navy. It is used even in the shells of the "Vesuvius," although she continues to be called a dynamite cruiser. Hence it is desirable to keep up the arrangements for producing it to a high state of efficiency. Besides, excellent experimental work is done at Newport, so that in the great future of high explosives it is necessary that the Navy Department should have the best appliances at its command.

Official returns for the middle of June published by the German Government show that the outlook, which was not very bright before then, has become very serious, particularly with regard to the hay crop. Some newspapers urge the suspension of import duties on fodder to follow the precedent established by France.

A Pneumatic Traveling Shop Crane

At the new shops of the Burlington & Missouri River Railroad, at Havelock, Neb., is a pneumatic traveling crane designed by D. Hawksworth, superintendent of motive power for the road. From the *National Car and Locomotive Builder* we take the following description:

This shop is 400 feet long. A standard gauge track is laid along its entire length, along each side of which the heavy tools are located and served by this crane, which is mounted upon a truck traversing the track. The crane is operated by a pair of reversible engines, run by compressed air, at a pressure of 60 to 80 pounds per square inch. The engine power is communicated to the front axle by friction. The car is moved by turning the lowest three-way cock, admitting air to the cylinders of the engines. The reversing valve is so arranged that the engines are always in back motion, and, by pressing the foot lever on the platform, air is admitted to the opposite end of reversing cylinder working the tumbling shaft and the motion changed.

The operator stands on the platform attached to the mast, and from this position controls all movements of the crane. The swing motion is obtained by turning the second three-way cock, which admits air to the cylinder underneath the car, that operates the rack and pinion in connection with the mast of the crane. Raising and lowering are controlled by an upper three-way cock, which admits air to the lifting cylinder, 13 inches in diameter and 7 feet stroke, at the top of the crane.

The air storage is distributed as follows: One main reservoir 42 inches in diameter and 6 feet high; three 9-inch tubes supported over lifting cylinder and suitably connected; mast, stay and jib are connected by openings in tube and castings. All are connected with service pipe, which is fastened to the mast and to which are attached throttle, swing, lifting and reversing valves, the pressure gauge and an alarm whistle. Different sizes of hose are used where flexibility in connection is required.

This arrangement affords storage capacity for 85 cubic feet of air on the crane, which is sufficient to permit of the crane being run out of the shop to platforms or cars, pick up a pair of heavy drivers, a cylinder or other heavy casting, and take the same into the shop to a machine or otherwise, as desired. The air is supplied by a Norwalk compressor, and convenient pipes and couplings are placed in the shop for charging the crane when necessary.

The rollers on top of the crane receive a double channel iron between them, which is fastened to girders in the shop and acts to steady the crane when serving machines.

The car on which the crane is mounted has four adjustable rail clamps, two on each side at the ends, to be used for enabling the car to make heavy side lifts. The following are some further particulars of this crane:

Capacity of crane.....	4 tons.
Maximum lift.....	7 feet.
Air pressure.....	60 to 80 pounds.
Air storage capacity.....	85 cubic feet.
Diameter of wheels.....	28 inches.
Gauge of track.....	4 feet 8½ inches.
Internal diam. of mast...	13 inches.
Internal diam. of jib...	10 inches.
Internal diam. of stay...	6 inches.
Internal diam. of air tubes.....	9 inches.
Internal diam. of air reservoir.....	32 inches.
Internal diam. of lifting cylinder.....	13 inches.
total height above rail....	15 feet 10 inches

The Bliss Double Crank Press.

The accompanying cut shows a double crank press of new design made by the E. W. Bliss Company of Brooklyn, N. Y. The frame has been changed considerably in design and has been materially strengthened. The engraving also shows the new method of connecting the two pitmans by means of the rod shown, so as to enable the operator to quickly raise or lower the slide without danger of getting the two pitmans out of alignment with each other and with the guides. This press is specially adapted for operating large cutting, forming, perforating and bending dies. It can also be made without gearing and with overhanging frame instead of the straight uprights shown. Its most important dimensions are: 36 inches between the uprights; die space, up and

13½, 18 and 24 inches in diameter with a 10-inch stroke. In constructing the engine lightness combined with strength has been the chief consideration, and it is said to weigh less than 3600 pounds. It occupies 14 square feet of floor space, and, it is said, will develop 600 horsepower. The boiler, a tubular one, is of the Mosher type, and will stand 250 pounds pressure.

The Adoption of Water-Tube Boilers for the New British Torpedo Vessel "Speedy."

There was launched recently in England a twin-screw torpedo gunboat, the "Speedy," which has excited an unusual degree of interest, owing to the fact that she is fitted out exclusively

long by 27 feet beam, with a depth amidships of about 15 feet. When completed she will have a displacement of 810 tons. Her armament will consist of two 4.7-inch and four 3-pounder guns, all rapid-fire pieces, and she will be fully equipped for discharging torpedoes. She is one of a group of torpedo vessels, or torpedo catchers, known as the "Jason" class. These craft are somewhat larger than their predecessors intended for the same kind of work and may be regarded as examples of the latest development of this modern type of vessel. In the case of the "Jason" and the other sister ships of the "Speedy," all having boilers of the locomotive type, the indicated horsepower is said to be 3500, estimated to give a speed of 19.25 knots. With the same dimensions and displacement, the "Speedy" is to have a contract power of 1000 additional units, or 4500 indicated horse power, and this is expected to give her a speed of not less than 20.25 knots, or at least 1 knot more than her sister ships are required to show.

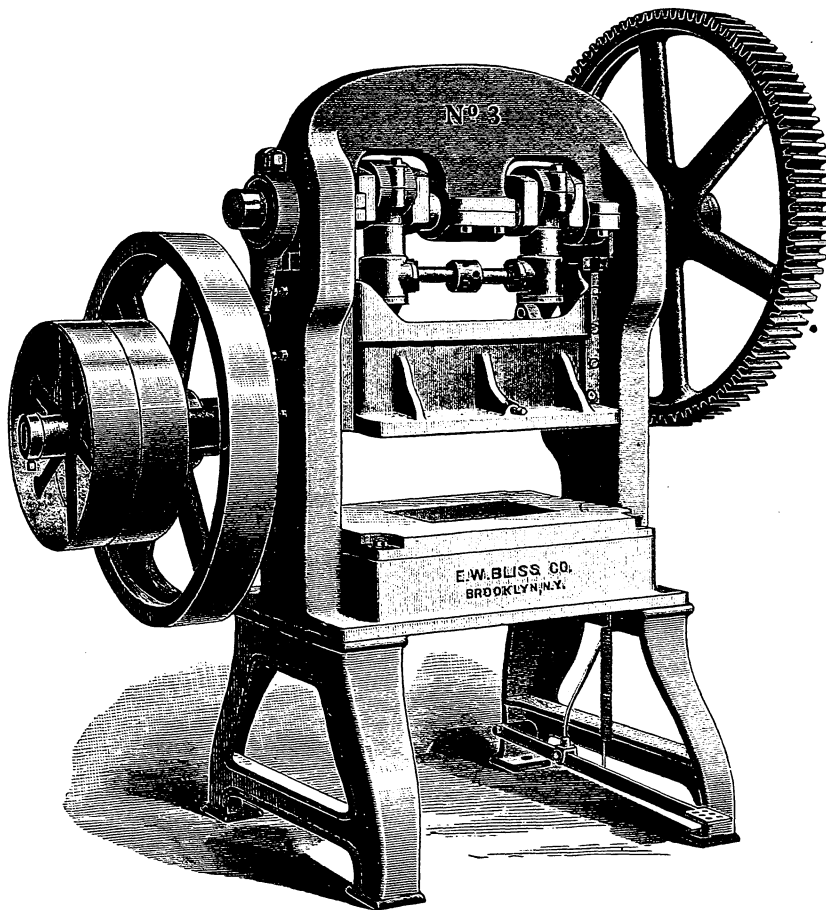
The "Speedy" presents a peculiar appearance, being very high out of the water forward and low aft. She is minutely subdivided into water tight compartments and the arrangement of the decks is such as to give her practically a double bottom forward and aft when the hatches are closed, while amidships there is only the single skin of the vessel. She was designed by Dr. W. H. White, C.B., director of naval construction, and is very lightly built.

There are two sets of triple-expansion engines, having cylinders 22 inches, 34 inches and 51 inches diameter, by 21 inches stroke. They are designed to run at 250 revolutions a minute, with a safety valve loaded to 210 pounds to the square inch. The cylinders are not jacketed. The steam reversing gear is so arranged that the engines are kept automatically going alternately ahead and astern for a few turns, when the ship is stopped, the object being to keep the cylinders warm and to maintain the vacuum. The screw shaft is hollow and of fluid-compressed steel. The condensers are entirely of brass.

The "Speedy" is to have eight boilers, all of the Thornycroft water-tube type, and all of them alike in every respect. Each one has 1840 square feet of heating surface and 25½ square feet of grate surface. The tubes are of steel and are from 1½ inches to 1¼ inches in diameter, the largest ones being nearest the fires. The working pressure is to be about 200 pounds to the square inch. The fire rooms are said to be unusually comfortable and commodious. It is possible to walk around each boiler, and any part of the casings can be removed for examination of the tubes. The boilers were built in place on board the vessel.

For purposes of comparison it may be added that the "Jason," of which, as has been stated, the "Speedy" is a sister ship, has four boilers, all of the locomotive type used heretofore in British torpedo gunboats. In the four boilers of the "Jason" the total heating surface is 6388 square feet, and the total grate surface 472 square feet, while in the eight boilers of the "Speedy" there are 14,720 square feet of heating surface.

A new cable grip, invented by Major McNulty, chief engineer of the Broadway cable road, New York, has been tested on that road.



THE BLISS DOUBLE CRANK PRESS.

down, 10 inches; adjustment, 2 inches; height, 90 inches, and weight 5500 pounds.

The steam yacht "Fiseen" ("Flying Arrow"), to make at least 30 miles an hour, has been built after designs by Gardner & Mosher of New York. She is 78 feet over all, 9 feet 6 inches beam, and draws about 3 feet of water. The hull is built of mahogany, brightly polished. She is modeled very much like the "Norwood." Her stem is straight and sharp, with very little freeboard, and the stern is flat so as to prevent squatting when going at full speed. She has good interior accommodations, and promises to be useful for cruising as well as for speeding. The engines are the most interesting part of this boat. They were built by Lysander Wright of Newark, from designs by C. D. Mosher, and are of the quadruple-expansion type. The cylinders are 9½,

with water-tube boilers. Another test will thus be afforded of the suitability of such boilers for naval use.

Like the Danish cruiser "Geiser," which showed remarkably good results on her steam trials, as described in *The Iron Age* of February 2, 1893, the "Speedy" is provided with Thornycroft water-tube boilers, and is the first British naval vessel of a size compatible with good sea-going qualities to be fitted with boilers of this kind. Among the advantages looked for as the result of their employment are ease and rapidity in generating steam, ability to stand a wide range of temperature, absence of inconvenience in case it should be necessary to stop the vessel suddenly or to change the speed frequently, freedom from liability to leakage, and greater power for a given weight as compared with shell boilers.

According to a description given in *Engineering*, the "Speedy" is 280 feet

The Engineering Congress.

The circulars of two of the national engineering societies relating to their Chicago meetings, which constitute their participation in the International Engineering Congress, have been issued. The meetings will be held during the week beginning July 31. The programme of the American Society of Mechanical Engineers is as follows:

Monday, July 31, 10 a.m., Art Palace.—General session of all sections. Addresses from officials of the Congress and replies. Section B adjourns to its allotted hall and transacts any general business, reports of election, appointment of Nominating Committee or special committees, &c. It is not expected that any papers can be presented at this session.

Tuesday, August 1, 10 a.m., Art Palace.—Report of Standing Committee on uniform methods of testing materials.

Report of Standing Committee to recommend a standard method for testing efficiency of locomotives.

"Tests of Purdue University Locomotive," W. F. M. Goss; "Locomotives Operated by Total Adhesion," A. Mallett; "Compound Locomotives," A. von Borjes; "Experience in Working of Rack Railways," A. Schneider.

Wednesday, August 2, 10 a.m., Art Palace.—"The Working of Centrifugal Machinery," Gust. Herrmann; "The Removal of Dust in Workshops," R. Kohfal; "The Taximeter or Fare Indicator," C. Pieper; "Apparatus for Metering Steam," Franz Seiler; "Improvements in the Art of Cable Making," Emil Guillaume; "Measuring of Water and the Schirzel Water Meter," F. Lux.

Thursday, August 3, 10 a.m., Art Palace.—"Contribution to the Theory of the Steam Engine," V. Develshauvers Dery; "Limitation of Engine Speed," C. T. Porter; "Compression as a Factor in Steam Engine Governing," F. H. Ball and D. S. Jacobus; "Performance of a Triple Expansion Pumping Engine, with and without Jackets," J. E. Denton; "Performance of Street Railway Power Plants," Wm. A. Pike and T. W. Hugo; "An Evaporative Surface Condenser," Jas. H. Fitts; "A Coal Calorimeter," Geo. H. Barrus; "Anhydrous Ammonia Gas as a Motive Power," T. W. M. Draper.

Friday, August 4, 10 a.m., Art Palace.—"A General Engineering Classification and Index," Wm. L. Chase; "Notes on the Drainage Machinery of the Netherlands," A. Huet; "The Refrigerating Machine of Today," C. Linde; "The Interchangeable System of Manufacture," W. F. Durfee; "Rod-Rolling Mills and Their Development in America," F. H. Daniels; "Technical Education in the United States," R. H. Thurston; "Haulage by Horses," Thos. H. Brigg.

Saturday, August 5, 10 a.m., Art Palace.—General session of all sections. Concluding addresses and general business. It is not expected that there will be any papers presented at this closing session, which will terminate by adjournment.

The American Institute of Mining Engineers has charge of two divisions, that of Mining Engineering and that of Metallurgical Engineering. The following papers are announced:

Division C. Mining Engineering.—"The Detection and Measurement of Fire-Damp in Mines," by Prof. G. Chesneau, Paris, France; "Hydrogen-Oil Safety Lamp," by Prof. Frank

Clowes, Nottingham, England; "Experimental Investigations on the 'Loss of Head' of Air Currents in Underground Workings," by D. Murgue, Beséges, France; "Tests of Hydraulic Cements," by Prof. H. Le Chatelier, Paris, France; "Genesis of Ore Deposits," by Prof. Franz Posepny, Vienna, Austria; "A Remarkable Deposit of Ores of Wolfram in the United States," by Dr. Adolph Gurlt, Bonn, Germany; "Geological Distribution of Useful Metals in the United States," by S. F. Emmons, Washington, D. C.; "Lead and Zinc Deposits of the Mississippi Valley," by W. P. Jenney, Deadwood, S. D.; "Origin of the Gold-Bearing Quartz of the Bendigo Reefs, Australia," by T. A. Rickard, Denver, Col.; "The Bertha Zinc Mines," by W. H. Case, Bertha, Va.; "Improvements in Ore-Dressing," by Oberberggrath O. Bilharz, Berlin, Germany; "Handling of Large Quantities of Iron Ore," by John Birkinbine, Philadelphia, Pa.; "An Improved Hanging Compass," by Guy R. Johnson, Longdale, Va.; "Mining and Mineral Statistics," by C. Le Neve Foster, Llandudno, Wales; "Utilization of Anthracite," by Eckley B. Cox, Drifton, Pa.; "Coke and Natural Gas," by Jcs. D. Weeks, Pittsburgh, Pa.; "Mining Schools," by Prof. S. B. Christy, Berkeley, Cal.

Division D. Metallurgical Engineering.—"Microscopic Metallography," by F. Osmond, Paris, France; "Micro-Structure of Ingot Iron in Cast Ingots," by Prof. A. Mertens, Berlin, Germany; "Segregation and Its Consequences in Ingots of Iron and Steel," by Alexandre Pourcel, Paris, France; "Micro-Structure of Steel," by Albert Sauveur, S. Chicago, Ill.; "Review of American Blast-Furnace Practice," by E. C. Potter, Chicago, Ill.; "New Direct Process for the Production of Pig and Refined Iron," by Alexander Sattmann, Donawitz, Austria; "Sulphur in Cast Iron," by W. J. Keep, Detroit, Mich.; "The Bessemer Process as Conducted in Sweden," by Prof. Richard Akerman, Stockholm, Sweden; "The Open-Hearth Process," by H. H. Campbell; "Blowing Engines," by Julian Kennedy; "The Limitations of the Stamp Mill," by T. A. Rickard, Denver, Col.; "Experiments on the Specific Gravity of Gold Contained in Gold-Silver Alloys," by Henry Louis, Singapore, Straits Settlements; "Summary of American Improvements and Inventions in Ore Crushing and Concentrating, and in the Metallurgy of Copper, Lead, Gold, Silver, Nickel, Aluminum and Zinc," by James Douglas, New York City; "Improved Slag Pots," by H. A. Keller, Butte, Mon.; "Consumption of Fuel in the Taylor Gas-Producer Plants at the Aspen and Marsec Mills Compared," by C. A. Stetefeldt, San Francisco, Cal.; "Electric Welding," by Edgar C. Moxham, Pulaski, Va.; "Alloys of Iron," by R. A. Hadfield, Sheffield, England; "Heat Treatment," by H. M. Howe, Boston, Mass.

A New Form of Lightning Rod.

A correspondent of *Engineering* states that an accident which took place a short time ago in one of the large Silesian foundries, and which almost proved of disastrous consequences, has induced the owners of the Carls Works in Bunzlau, Silesia, Germany, to make a rather ingenious invention, to which public attention ought to be turned, the question being of importance.

Some time ago the heavy iron bar at the upper end of the lightning conductor of one of the high chimneys in the foundry fell from its considerable height and caused great damage. The reason was that the vapors escaping from the mouth of the chimney had completely destroyed the lower part of the iron bar. In another case, where the bar was of copper, the lower part became completely oxidized, and the bar bent over and fell. Owing to the ever varying composition of the coal, containing, for instance, greater or smaller quantities of pyrites, and developing therefrom sulphurous acid by combustion, there must always be danger of complete oxidation and falling down of the lightning bar. The question is now, how to stop this inconvenience?

The Carls Works, Bunzlau, in Silesia, Germany, have met the case in the following ingenious way: The metal bar, being, as a rule, about 4 feet in length and 1 inch in diameter, is surrounded or inclosed by a system of glass tubes of a special form. The interval between metal and glass is filled up by a special kind of cement. The upper end of the highest tube is covered hermetically by a small conical glass, allowing only the platinum point of the bar to project.

The advantage of the construction is obvious. The glass is not susceptible to atmospheric or chemical influence. But there is still a second point worthy of consideration. As a matter of fact, any metal will lose more or less its quality of conducting electricity by oxidation of even only its surface. Thus in time the whole lightning conductor may become useless. To prevent even the slightest oxidation, the above apparatus is suitable.

An Important Chicago Failure.

Forsyth, Hyde & Co., 68 and 70 Dearborn street, Chicago, made an assignment on the 6th inst. to E. Louis Kuhns. The Wisconsin Furnace Company of Fond-du-Lac, Wis., operated under the control of the firm, also assigned to the same person. H. S. Willard was appointed receiver for the Wellston Furnace Company of Wellston, Ohio, another enterprise in which they were heavily interested. No other companies are known to be involved.

The firm of Forsyth, Hyde & Co. have long been prominent in the Western pig iron trade, but particularly so in the past year through the extension of their business over a much wider field. They opened branch offices in Cleveland and Pittsburgh, and had arranged to open one in Cincinnati when paralysis in the iron trade began to make itself unpleasantly noticeable. They formed connections with capitalists interested in the operation of other blast furnaces than their own, and thus controlled the sale of a very large output of pig iron. The financial stringency, however, proved too severe for them to endure the strain, and they have been obliged to discontinue business. Several thousand tons of charcoal pig iron made at the Wisconsin Furnace are held by Chicago banks for money loaned on storage certificates.

Abram Reese, rolling-mill engineer, of Pittsburgh, has just been granted patents in England, France, Germany and Belgium for the Reese Universal beam mill, an illustrated description of which appeared in *The Iron Age* of March 30 last.

The Storar Packingless Valve.

The first valve of this kind, made by F. Storar of Springfield, Ill., was placed on an engine using steam at 80 pounds pressure, and, after several months' service, has shown no indication of any leakage. The casing through which the stem passes is chambered; into this a small quantity of cylinder oil is poured through the small tube on the top for lubricating the conical collar on the stem, the oil passing through a small hole drilled in the seat. There is also a small groove cut around the conical collar and one on the seat, opposite each other, the object being to keep the two faces lubricated to prevent friction. The operation of the valve will be clearly understood from the drawing. Every time the valve is opened or

duration, weight of armament, and freeboard, as well as steadiness of gun platform. But apparently it is felt that the balance of argument is in favor of restricting dimensions within some reasonable limit, in view of the possibility of the largest and most costly ironclad being disabled and sunk by some mishap of navigation or of battle.

Cruisers cannot be expected to achieve the best results without great speed and large coal endurance. To secure these essentials, and, at the same time, to permit a moderate degree of armor protection to be given them, vessels of this class have been built or designed recently which show a considerable increase in size over those of an earlier period. Evidence of this is afforded by the English armored cruisers "Blake" and "Blenheim," each of 9000 tons displacement, by the Russian armored

ship, for which 18 knots appears to be accepted as the highest limit.

There are at present no indications of the abandonment of armor, which a few years ago was anticipated in the near future. On the contrary, the increased resistance now attainable by the use of nickel steel, especially when treated by the Harvey process, will tend to insure the continued use of such protection. English and French experiments are held to have demonstrated that for the upper works of every fighting ship it is important to have protection by thin armor capable of resisting shells charged with high explosives fired from rapid-fire guns.

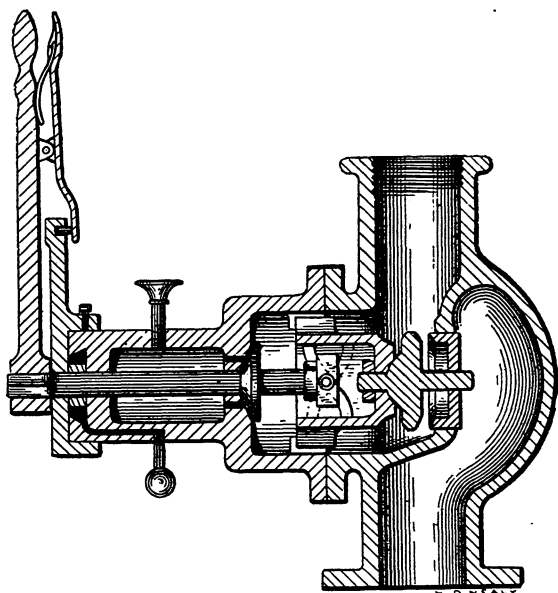
Lord Brassey expresses the opinion that in an encounter between an armored and an unarmored ship the issue could not be doubtful. The unarmored ship would be blown to pieces. That this view is generally accepted is evident from the attention now devoted, in designing new ships, to the question of protection and to the manner of arranging the weight of armor to be carried, in order to secure the best results. To guard the vital parts of the ship the protective deck is being given greater thickness than was formerly thought necessary, and in some cases a second armored deck is proposed. The problem of insuring the protection of gun's crews and the working parts of guns has assumed a new importance, owing to the great development of rapid-fire ordnance and to the high initial velocities now attainable. A higher initial velocity means a flatter trajectory and consequently greater certainty of aim, especially at sea.

In considering the subject of ordnance it is of interest to note that no power now mounts for sea service on board new ships the enormously heavy guns which were adopted in some cases a few years ago. There is no likelihood that 110 ton guns will find a place in future armaments. For the rapid fire guns, which are now deemed of so much importance in all navies, 6 inches is practically the limit in caliber. France, which has no rapid-fire piece of exactly this caliber, has one of 6½ inches. Higher initial velocities are continually being obtained. In France, Canet has obtained 3300 feet with a 4-inch gun 80 calibers long, but this is an experimental piece entirely too long for active service.

The heaviest guns now being mounted on board ship abroad are: In England, 68 tons; in France, 45 tons; in Italy, 68 tons; in Germany, 36 tons, and in Russia, 56 tons. The 10-inch, 29-ton gun, with which the new English battle ships "Barfleur" and "Centurion" are armed, is looked upon with much favor.

The heavy guns referred to as now being mounted in England are usually termed 67-ton guns. They are Armstrong pieces, having a caliber of 13½ inches and firing a projectile weighing 1250 pounds, with a charge of 630 pounds of powder. They can perforate 30 inches of wrought iron placed at the muzzle, or 26 inches at a distance of 2000 yards. The Italian guns, weighing 67.9 tons, also of the Armstrong type, are similar to these.

In France the plan formerly followed of mounting heavy guns singly has been given up, after much hesitation, and in new battle ships such guns are to be mounted in pairs in closed turrets, the object in placing them together being a more effective distribution of armor and an increase in the auxiliary armament, for which additional space thus becomes available.



THE STORAR PACKINGLESS VALVE.

closed, the pressure from within keeps the conical collar firmly pressed against its seat.

Naval Ships and Guns Abroad.

According to Lord Brassey's *Naval Annual* for 1893 fewer ships than usual have been laid down for European navies within the past year, but there has been a concentration of effort on those already on the stocks or completing afloat. There is observable a marked tendency to restrict the displacement of battle ships. In England the new first-class battle ships of 14,150 tons displacement mark a limit not likely to be exceeded in any new designs. In France ships of nearly 12,000 tons displacement have been laid down recently, but this size was adopted reluctantly, and is not apt to be repeated. In Italy, the pioneer in the policy of carrying naval construction to extreme dimensions, it has now been decided to abandon the plan of constructing such monster ironclads as the "Italia" and the "Lepanto," each having a displacement of 15,900 tons. The new Italian battle ship "Ammiraglio di Saint-Bon" is to be of 9,800 tons displacement. Neither Germany nor Russia has ships equal in size to the largest ones now building in England and in France. Large size is recognized as being necessary in order to give ample armor protection, speed, coal en-

durance, weight of armament, and freeboard, as well as steadiness of gun platform. But apparently it is felt that the balance of argument is in favor of restricting dimensions within some reasonable limit, in view of the possibility of the largest and most costly ironclad being disabled and sunk by some mishap of navigation or of battle. Cruisers cannot be expected to achieve the best results without great speed and large coal endurance. To secure these essentials, and, at the same time, to permit a moderate degree of armor protection to be given them, vessels of this class have been built or designed recently which show a considerable increase in size over those of an earlier period. Evidence of this is afforded by the English armored cruisers "Blake" and "Blenheim," each of 9000 tons displacement, by the Russian armored

cruiser "Rurik" of nearly 11,000 tons displacement, and by other somewhat similar vessels recently completed or still building. Apart from the protective deck, a feature common to all of them, vessels of this class show decided individual peculiarities in the distribution of their armor, which, in some instances, is devoted to casemates protecting the gun positions, and in others forms a complete or partial belt. The new French armored cruiser "Dupuy de Lôme," smaller in size than those already mentioned, being of 6300 tons displacement, differs from the other modern ships of her class in that she is covered with what is practically a complete coating of armor 4 inches in thickness. This extends over the whole of the hull proper and over a part of the superstructure. Besides the usual protective deck, she has also a splinter-proof deck extending over the boilers and engines, the space between the two decks being filled with coal. France now contemplates building armored cruisers of 7500 tons displacement.

The tendency shown in the latest designs adopted in foreign navies to restrict the size of battle ships and to give greater displacement to armored cruisers will cause these classes to approximate more and more closely to each other in some respects. The speed of the cruiser is not, however, sought in the battle

Western Foundrymen's Association.

The regular monthly meeting of the Western Foundrymen's Association was held Wednesday evening, June 21, at 225 Dearborn street, Chicago. In the absence of the president, C. A. Sercomb of Milwaukee was elected chairman *pro tem*. The treasurer's report was read, accepted and ordered placed on file. The following names were proposed for membership:

William Ferguson of Chicago.
W. A. Jenkins of Sterling, Ill.
F. A. Wigham of Chicago.
Chicago Foundry Supply Company of Chicago.
J. S. Hibbs of Philadelphia, Pa.
H. F. Frohman, Cincinnati, Ohio.
Charles W. Sisson of Louisville, Ky.
Chicago Skein & Axle Company, Chicago, Ill.

These gentlemen and firms were unanimously elected as members of the association, and the secretary was instructed to notify them of that fact.

The secretary read a letter from C. A. Plamondon, containing his resignation as president of the association on account of illness in his family and his inability to attend the meetings. On motion, the resignation was accepted. It was decided that the matter of selecting a president be postponed until the next regular meeting.

The secretary read the following: "A. W. Walburn of Walburn-Swenson Company, Chicago, makes the suggestion that all members of the association shall place on file with the secretary a statement of their capacity, the kinds of castings they make, the number of men they employ, &c. Should this be done, when one of the members receives an order that he cannot fill he could refer the intending buyer to the secretary, who would send notices to the various members who make the kind of work required, that they may bid on the job."

The suggestion was discussed freely by the members present, and it was, on motion, referred to the Executive Committee.

The following communication was read from Ernest W. Cook of Armour Institute:

ARMOUR INSTITUTE,
THIRTY-THIRD STREET AND ARMOUR
AVENUE, CHICAGO,
F. W. GUNSAULUS, president.
CHICAGO, June 6, 1893.

Mr. C. A. Plamondon, president Western Foundrymen's Association, Chicago.

DEAR SIR: Having had our attention called to the notice in the Chicago *Journal of Commerce* of June 1, of the organization of the Western Foundrymen's Association for the advancement of foundry practice, we wish to inform you that Armour Institute has under consideration the establishment of a testing laboratory to be equipped with the most recent and accurate machinery for testing, chemically and mechanically, all kinds of material used by the engineering world. Part of our equipment for such a laboratory would be the following: Tensile, transverse and torsional testers; cement and wire testers; a micrometer of $\frac{1}{1000}$ inch accuracy; gravity and microscopic machines, and a complete mechanical room, furnished with the most recent and perfect apparatus for analyses. We should be pleased, therefore, to confer with your association with a view to an arrangement whereby Armour Institute might

furnish reports from its laboratory, daily or weekly, to the association or its members. In the event of such an arrangement, we would wish the members to avail themselves of the opportunity to be present during any tests that they might desire to see made.

Our various technical departments are now being fitted up preparatory to the opening of the institute in September, and we hereby extend an invitation to your association to inspect, at a stated time convenient to yourselves, the apparatus which is being installed.

The Department of Mechanical Engineering is for the benefit of all young men who wish to become practical engineers. The full engineering courses are four years in length, the course in mechanical engineering requiring six hours daily for the theoretical and practical work. A summary of the work in this department will show the practical character of the instruction. All classes of engines will be designed and constructed up to 100 horsepower, single, compound, triple expansion, quadruple expansion, double compound, and all kinds of machinery will be thoroughly investigated and their merits and defects analyzed. All known makes of boilers and as many engines as possible will be practically tested and operated in the engineering laboratory during the fourth year.

It is the aim of the Armour Institute to produce men thoroughly familiar with the construction and operation of the general forms of machinery, and who, when given a machine to design or a problem to solve, will execute their work promptly and accurately.

The theory that is required for mechanical engineering will be thoroughly treated, but the purpose of the institute throughout will be to prepare its students to handle practical problems in a masterly way.

On behalf of the Technical College of Armour Institute, I remain, very truly yours,
ERNEST WM. COOKE,

Director of the Department of Mechanical Engineering.

After discussion of the advantages to be obtained by accepting the invitation of Mr. Cooke, it was moved and carried that a special committee be appointed by the chair to confer with Armour Institute and report at the next regular meeting. Messrs. Gardner, Whiting and Wigham were appointed to act as such committee.

The following communication was read from Mr. Howard Evans, secretary of the Foundrymen's Association:

PHILADELPHIA, June 19, 1893.

Mr. B. M. Gardner, Sec'y Western Foundrymen's Association:

DEAR SIR: At the meeting of this association held in May we discussed a plan of operation regarding new associations or those already formed. It is our wish to assist in any way possible to advance the general interest of the foundry trade. Our association at Philadelphia is not a local affair, as a number of publications have stated, but it is national in character. Its membership is composed of foundrymen from all parts of the United States. In reality it should be called "The National Foundrymen's Association." We have decided not to change its name. We have had communications from various parts of the country—viz., Chattanooga, Pittsburgh, Denver, Cincinnati, Boston and Washington, D. C., stating that new foundrymen's associations

were being started. We therefore published what we called Foundry Circular No. 1. We addressed it to associations already formed, or those about to be formed, the idea being to co-operate and to assist in any way within our power other associations or chapters. You, no doubt, presented it before your association at the meeting in Chicago on May 25, as stated by some of the trade papers, although I have had no official notice of it. I hope you will take this matter up in your meeting and make reply. You will notice the particulars of our last meeting, as taken by a stenographer, in *The Iron Age* of June 15, also in the *Iron Trade Review* of same date, and other trade journals. In the *Foundry* of June 10 you will find the proceedings of our May meeting.

You will notice our aim is to procure information of interest to all foundrymen. We have also taken an active interest in securing statistics, to teach those foundrymen who do not know the cost of making their castings, hoping to show them in the end the folly of selling them in the open market at the very low prices at which they are offered. The question of making a schedule of prices, also the price of wages, we have let alone; they will be for an after consideration. Other associations in almost all branches of trade have been formed, whose objects have been to advance prices. They have all failed. For that reason we think it advisable to take another course. Our meetings are always well attended, our membership is increasing and the prospects are very bright for our association. There is no reason why your Western association should not do equally as well. Wishing you success and awaiting your further commands, I am,

Yours, respectfully,

HOWARD EVANS,

Sec'y Foundrymen's Association.

Moved and carried that the communication from the Philadelphia Association be received and placed on file.

A paper prepared by Thomas D. West on

The Unexpected in the Foundry was read by the secretary:

In a sense, the whole day's routine of a foundry manager may be said to be a battle with emergencies or the unexpected; for, from the moment he steps into the shop until he leaves, the unexpected is constantly rising to keep him perplexed and at his wits' ends to devise ways and means to overcome difficulties and get rid of obstacles. Of course, every tradesman thinks his trade the worst business going, and for one I do not desire to persuade him differently, for to have to labor for a living at anything is acknowledged to be generally disliked. And there follow, by more truth than poetry, the comments of the foreman, who, when asked for a job by a man who said he was willing to work, replied, "No, my man, you are laboring under a delusion; it is not your willingness, but necessity that compels you to work." And from my experience in the foundry I feel safe in saying it is not love for labor that holds the founder in harness. I wish to be charitable to all trades, but I do feel justified in saying that the founder's lot is one of the worst, and I have often heard the heads of manufacturing plants, embracing a dozen trades, intimate that the foundry manager's lot in life was the most perplexing and arduous of any trade they knew. Whether such be true or not, foundry managers know they are annoyed and worried so often that life seems little worth living for, mostly on account of the different emergencies constantly ensuing in their daily labors. To lessen the burden of such we can be of much assistance to each other by a recital of our trials and the way they were overcome. I believe there is not a founder living but has had some exceptional experience with the unexpected, which if related would be sure to benefit some of our benighted tradesmen. For these monthly

meetings there is no member but could cite some experience with the unexpected and assist in making the meetings a success. As a starter for myself, I will offer for discussion a little of the unexpected in cupola practice, and will condense the matter as much as practicable, for with these class-meeting chats, as they might be called, I think it well they be limited so as to give all members a chance and have ample time left for discussion. It is through the interchange of ideas and experience that the greatest benefit should be derived from such a meeting of practical men. My little chat upon the cupola I will present in the form of a query for discussion, hoping others will follow with their ideas and experience, stating what they would advise in the case of a bunged-up cupola at bottom drop. The following is the course practiced by the writer:

Often through carelessness or ignorant management, and through use of poor fuel and undesirable irons, as well as by running a cupola beyond its capacity, it will become "bunged up" so as to stop melting. When the bottom is dropped the cupola may be left holding half its charging height in fuel and iron, and if it cannot be got to drop by poking at the tuyeres the tendency is for air, which could not get through the bunged tuyeres to get up after the bottom drops, through the porous center, and cause combustion of fuel sufficient to bring on melting of the iron for awhile. The droppings of this tends to form a cake or bridge of iron, fuel and slag mixed, which can so completely bung up a cupola as to cause a shutdown for a day to clean the cupola out. To prevent such occurring there must be active work from the moment it is seen that the cupola will not drop. In my practice, we first try to see what can be accomplished by poking the tuyeres with iron and steel bars, sometimes using a sledge on the same, if in five minutes after bottom-drop the same course is found to not be effective. Water is then thrown into the cupola to stop as soon as possible all melting of the iron, and cool off the cupola. This is, of course, a little destructive to the brick lining and is used only as a last resort, but with care in throwing it in, little need be splashed against the lining. A few pailfuls of water soon stop all melting and cool the top of the hanging stock sufficient to admit of men inserting a long, heavy bar from the charging door into the center of the bunged stock; and by pounding upon the top of the bar with a heavy sledge the chances are very favorable of driving it through the stock and thereby get a hole started, which, if followed up or enlarged by another bar or pulling it up by means of a light chain or rope tied to it, a hole large enough to admit a man is soon made. This, when accomplished, is all that is necessary to further labor for, until the cupola is cool enough for a man to enter and complete the work.

By the above practice I have seen some very badly "bunged up" cupolas cleaned without shutting down for a day, retarding the next day's heat or making that night one of torture and worry for the foundry management.

The paper was discussed by the members present. Mr. Ferguson thought it was the best kind of a case to show a man's individuality, although it would not properly be classed as an emergency case. In his experience it would occur mostly in cupolas of smaller diameter. He said that in days gone by it might have been called an emergency case, but to-day foundrymen are on the lookout for it.

Mr. Wigham thought that it would be impossible to say what could be done to remedy such an accident unless the cause were known. It might be caused by various incidents.

Mr. Vrooman agreed with Mr. Wigham.

A paper by Wm. Ferguson, superintendent of the foundry of Fraser & Chalmers, on

Development of the Foundry in America the Past Thirty Years

was then read:

This is too broad a subject for any one to attempt to cover with much satisfaction in one short paper, therefore we will not deal with details to any great extent.

One often hears the remark that there has

been less advancement in the foundry than in any of the other departments of engineering. Judging from the same standpoint as the other departments are measured from—viz., special machinery, this may be true. But from a purely mechanical standpoint the facts in the case show that the foundry has developed as rapidly and as thoroughly as the other departments, and has met all requirements put upon it: and while doing this, it is surprising to think how well it has met these requirements, in the face of such opposition as it has had to contend with, coming from those who should be most interested in its success. Is it not an acknowledged fact that the foundry has been the most neglected department in the majority of engineering plants in this country? And it is only of very recent years that manufacturers have begun to realize that this department was deserving of some attention. For this change much credit is due to those who, having the knowledge and ability to do so, spared no pains in putting their experience and knowledge before the world in the shape of books and articles in mechanical papers bearing on the subject of foundry practice. These writings have not only helped to educate the molder in his business, but have set manufacturers to thinking that the foundry required some of their attention, and was not altogether the miserable and dirty place they had supposed it was.

And truly it must be said that the standing of the molder and his business 30 years ago was not an enjoyable one; and along with this the general impression prevailed that it was a business to be taken up by those only below the average in intellect and not very bright. As an illustration of this I remember an incident that occurred about 30 years ago. A young man just from the farm applied for a position to learn the machinist's trade, and his uncle, who was manager, after looking the young man over, expressed the belief that he would not make a machinist, as he "did not look overly bright," but that he might do well enough to make a molder. So the young man was put in the foundry, and to his credit, it must be said, made a decided success.

With the rapid development of this country after the late war came the growth and development of the iron business, and each succeeding year found the manufacturer enlarging his plant to meet requirements. In those days it was unusual to cast daily. Some of the largest plants were satisfied with three heats per week, and each heat perhaps would not exceed three to four tons. Coke at this time was just being introduced as a substitute for Lehigh coal to melt with, and there was not the varied number of different brands of pig iron, nor of as good quality as we have at this present time.

And while there were good molders in those days they were not taxed as to quality and quantity as they are to day, through keen competition; and the good molder of those days was sure to be a privileged as well as a bibulous character, and was quite likely to go on a spree just as he knew his services were about to be required on some special job.

While this is not altogether wiped out it is fast going, and it is rarely we see such cases now. We cannot speak of the foundry now without making mention of the molder, therefore you will pardon me for identifying him with the progress of the foundry.

Along with the enlarging of plants came the development of the foundry, and the requirements of the molder were taxed accordingly. Small plants were forced to take large contracts far beyond their capacity to fill, and in such cases the energy and ability of the foundryman were called upon to meet these requirements, and with varied degrees of success, until said contracts were complete. The foundryman with a 30-inch cupola would be called upon to make a 4 or 5-ton casting, with possibly a 3-ton crane to handle it. If he would ask for a larger cupola or stronger crane he would be told that was out of the question. "We had not figured on the extra expense while taking the contract, and we must now make it with such appliances as we have." Then came the anxiety of the foundryman, planning and making with nothing suitable to do the work, but finally succeeding in getting what he considers a good, safe mold ready to be filled. The cupola is got ready with special care, and charged so as to do its best possible melting, for the final success now depends on this part of the business. But when everything pos-

sible has been done, we then can see it is going to be too much for the small cupola to do. No one but the foundryman who has been there can tell the mental strain that takes place with all this cast of molding and melting to be finally lost, simply for lack of proper tools to do the required work. Still, in these cases, the loss was usually charged to the foundryman not understanding his business, when the fact is, as I have stated, it is chargeable to lack of proper facilities.

And in most cases this same thing had to be repeated more than once before the parties interested would conclude to increase their facilities, and this they were most always sure to do only to meet the present requirements, with the result that they would in a short time again find themselves in the same condition as before.

Such has been the history of development in the foundry, and most men who have been engaged in this business for any length of time know that they have paid well for their experience in this way. It has been noticeable also that where the facilities were about equal to the requirements the foundry was usually as free from loss as other departments. And by this admission we have arrived at a point where we must allow that to get good results and work from a foundry with the greatest economy it must be done with proper equipment.

Manufacturers are each year becoming more alive to the real cause of bad work and excessive cost, and, as a result, are spending more time and money to equip their foundries, but still there is plenty of room for improvement. In former years it was the pride of the manufacturer, in showing visitors through his plant, to take them through the machine shop and pattern shop, showing everything in detail, but when they came to the foundry he would pass it by as though it was not a part of his institution. Not so with the modern foundry, with its electric and hydraulic cranes, molding machines and patent cupolas. It proves to be as interesting as the other departments, and there is a correspondingly brighter future ahead for the foundry and the molder. And each year adds greater proof that brains are not only needed but are used to a greater extent in this part of engineering than most men are free to admit. The day is not far distant when the work of the founder will have the rank and standing in the mechanical world to which it is so justly entitled.

A discussion followed in which several members took part. Mr. Penton said that more had been done in the way of improving iron foundries and securing approved appliances in the last three or four years than had been done in any previous ten years. He could recall a large number of foundries containing these improvements. Among others he named Sellers & Co., and Baldwin Locomotive Works, Philadelphia; the Walker Mfg. Company, in Cleveland; Fraser & Chalmers, in Chicago, and the Lake Erie Engineering Company, in Buffalo.

Mr. Wigham remarked that a better equipped foundry than Fraser & Chalmers', in Chicago, could not be found.

Mr. Sercomb told of machinery he had seen at the World's Fair for transporting iron. He also spoke of the advances made by foundrymen, and thought they were due to a great extent to capital, to the ability to buy machinery to facilitate work. He cited cases where in former times as good work was done without the machinery by perseverance and more time.

It was moved that a vote of thanks be extended to Messrs. West and Ferguson for kindly furnishing material for the evening's discussions.

Mr. Penton reported having had some correspondence with R. A. Hadfield of England, who is to visit this city in August, and suggested that the gentleman be invited to address this association at its August meeting.

The meeting adjourned until the third Wednesday in July.

B. M. GARDNER, Secretary,
1419 Monadnock Bldg., Chicago, Ill.

Cornering or Rounding Machine.

An improved four-headed rounding machine, designed for finishing shafts, poles and all kinds of bent stock where the diameter varies, has been brought out by the J. A. Fay & Egan Company of Cincinnati, Ohio. The frame is heavy and strongly braced, and of ample floor space, which is necessary for a machine of this class to withstand the high rate speed at which the heads are run. The mandrel is of steel, 2 inches in diameter, and is provided with long journals running in self-oiling boxes. One end of the mandrel projects beyond the frame to carry a jointing head, as shown in the cut. The heads are perfectly balanced and the cutters are placed in the heads in such a way as to insure the smoothest and finest work. Each pair of heads

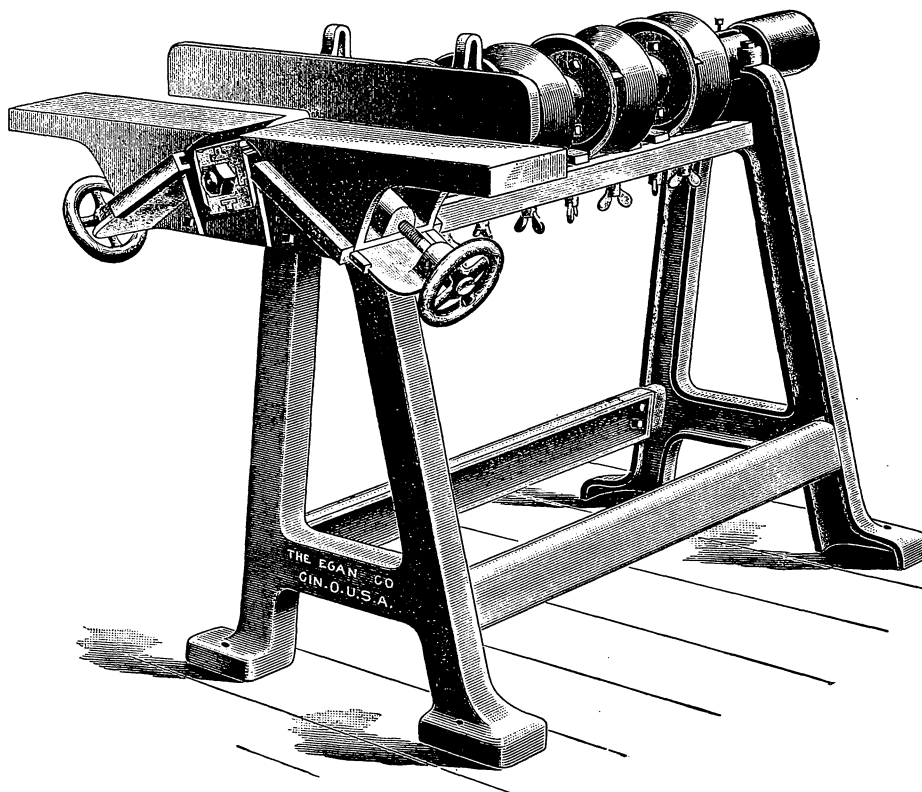
of Homestead, Pittsburgh district. Some time ago Munhall & Scott drilled a well on the S. A. Morrison farm, which was a good gaser, and last week they drilled in another, which has an estimated pressure of 150 pounds to the minute through a 6-inch casing. It is making gas from the Gordon sand. This well is about $5\frac{1}{2}$ miles south of Homestead.

Fire-Box Steel.

At a recent meeting of the Northwest Railroad Club William McIntosh of the Chicago & Northwestern offered the following brief paper on the question "How much can railroads afford to pay for good fire-box steel, and can it be procured at any reasonable price?"

half longer service, it would be wisdom to get it. This does not admit of discussion.

The question now arises where are we going to obtain this good steel, is it in the market, can it be manufactured? My knowledge of the manufacture is limited, and I will not undertake to do more than say that I think such a quality of steel can be procured at the figures now quoted, or even at a less cost. The quality of fire-box steel has either deteriorated during the past ten years, or the conditions of service have so radically changed that it is destroyed much quicker. I draw these conclusions from observations during that period; and as an illustration I will say that I have taken out fire boxes within the past few years that had been in service from eight to ten years, and I have recently removed fire boxes that



CORNERING OR ROUNDING MACHINE.

is furnished with different shapes of cutters, so that shaft or any kind of stock with different diameters can be passed from one pair of heads to the other to suit its diameter. The guards or guides encircle each head. They can be set to and from each other by set screws provided for this purpose. These guards act as rests for the stock when passing it over the cutter heads, so that by a change of position of the stock on the guides, almost any shape can be obtained. The jointing head and tables, to raise and lower by means of hand wheels, permit of jointing up or squaring pieces in addition to rounding or cornering.

A bore hole at Paruschowitz, Silesia, Germany, had marked a depth in May of 2000 meters, or 6562 feet. Boring will be continued as far as possible. The deepest bore hole hitherto is that at Schladebach, Saxony, which is 1748 meters, or 5735 feet.

What seems to be showing for a new gas district has just been tapped south

The expense of renewing fire-box sheets is so great that railroad companies can afford to pay much more for this steel than they are now paying, if by so doing they could procure material that would give longer service. The value of the steel sheets used in repairing and constructing fire boxes represents but a small part of the cost of such repairs and renewals—I estimate not more than 10 per cent. On the one hand we have the cost of material and on the other we have the labor that is required in this work, the expense of tearing down machinery that otherwise would not have to be disturbed, and the loss of service of the engine, which, for the time required to put in a new fire box, would average not less than six weeks or 45 days and amount to \$360, on a conservative estimate of \$8 per day as the value of such service. This item alone aggregates several times the value of the steel needed for the new box. It is therefore obvious that if it were possible to procure a better quality of steel, even at double the price we are now paying, which would render one-

have been in service but four years. I have also renewed sheets that were in service but one year. The fire box that gave ten years' service was crucible steel and the sheets that lasted but one year were from the open-hearth furnace. Whether the latter process allows the raw material of an inferior quality to be introduced I am not prepared to say positively, but I think it does. That only the best of material is used in the former process goes without question. Whether the open-hearth process can produce a better quality of steel by taking the same quality of metal to commence with that the crucible method uses, is a question that steel makers can best determine. The subject is one well worth investigating, as there is a wide margin of economy outlined in this proposition. Complaints are general throughout the Western country about the unsatisfactory service obtained from fire-box sheets, and it is my opinion that if some enterprising manufacturer produces a superior quality of steel he will find plenty of purchasers for it.

Mesaba News.

A mine that will probably do as much this year as any property on the Mesaba Range is that of the Missabe Mountain Iron Company, in section 8, township 58, range 17—*Missabe* being the Ogibway or Chippewa way of spelling the Anglicized *Mesaba*. It has a developed ore body 2200 feet long by from 600 to 1000 feet wide, and of a depth, so far determined, of from 40 to 100 feet, though none of the test pits in the well-defined area of the ore have yet got to the bottom of the deposit. The cubical contents of this mine, so far as known, can be estimated with comparative ease. It is believed that the further explorations soon to be made will show the ore to cover 120 acres out of the 160 in the tract. The mine was discovered about two years ago and since that time 83 test pits have been sunk into the ore body. Of these, three have gone into 100 feet of ore, and the rest average fully 50 feet and still bottomed in ore. During last winter the mine was leased to Henry W. Oliver of Pittsburgh for 20 years, on a minimum annual output of 400,000 gross tons, except for 1893, when the output is to be at least 200,000 tons. The rate of royalty on this ore is 65 cents per ton, of which the State of Minnesota, owner of the land, gets 25 cents and the company the remainder. The State will get, therefore, under the terms of this lease, an annual income of \$100,000 from this single property of 160 acres.

The Oliver Mining Company, who have assumed the lease made by Mr. Oliver personally, have so far done such exploratory and preparatory work as to insure the mining of the minimum amount this year if it can be taken care of afterward. A steam shovel cut in the ore body, running from northwest to southeast, and long enough to hold a train of 15 cars, has been made three cuts, or about 50 feet, wide. Through the length of this cut the shovel will dig a deeper cut for a track directly in the ore, laying the ore taken out on either side. Mining operations will then be carried on by placing the steam shovel in the cut and loading cars directly from the natural bed of the ore without blasting, timbering, machinery or men. As has already been shown, an average speed in loading of a 20 ton car in five minutes can be effected. The surface over the ore in this mine runs from 4 to 15 feet in the ore body so far exploited, and the ore is dry, no water having been encountered until a depth of 65 feet was reached. By mining in the way indicated and working toward the southwest, an ore breast of 60 feet is reached near the boundary line of the mine. It is estimated that the cost of stripping and mining the ore, placing it on cars, will not exceed 25 cents per ton. With lake freight at 95 cents from Duluth to Cleveland, as at present, and rail freight 80 cents to Duluth docks, this ore can be laid down in Cleveland or Fairport, where are the Oliver docks, at a very reasonable price.

The highest assays on the Mesaba Range, 69.64 iron and 0.022 phosphorus, have been made from ore taken from one of the 100-foot pits of this mine. The average of 500 assays from the 83 pits, surface to bottom, is 62 iron and 0.039 phosphorus. An advance royalty of \$75,000 was paid by the Oliver Company last spring, to be taken from the regular royalty at the rate of ten cents per ton, as mined, and

the company have paid their first semi-annual dividend of $4\frac{1}{2}$ per cent. on par value of their stock. A majority interest in the \$2 657,600 of the stock is owned by L. J. Merritt & Son of Duluth, who are also managers of the company. Besides this mine the same company hold 2200 acres of fee and leased lands along the Mesaba Range.

The Oliver Mining Company have a mining equipment of three heavy locomotives, two of them built by the Pittsburgh Locomotive Works; three steam shovels—one a very large machine—and about 100 flat cars. They have laid about 3 miles of standard gauge track in and about the mine. This sort of mining equipment will strike any old miner as a trifle peculiar for getting out iron ore. A large force of men is now engaged in cleaning off by hand the top of the ore body as exposed by the steam shovels. As soon as this is done mining will begin. A contract has just been let to Drake Stratton & Co. of Pittsburgh for stripping 200,000 yards of earth this season.

The Biwabic mine is now loading successfully by shovel direct from the ore body, filling a car in from four to five minutes.

A find of several thousand tons of manganese has been made on the Moose property, which is in the same section as the Missabe Mountain, and is operated by John B. Weimer. The ore runs up to 55 per cent. manganese, 9 per cent. iron and 0.070 phosphorus.

A Test of Carpenter Shells.

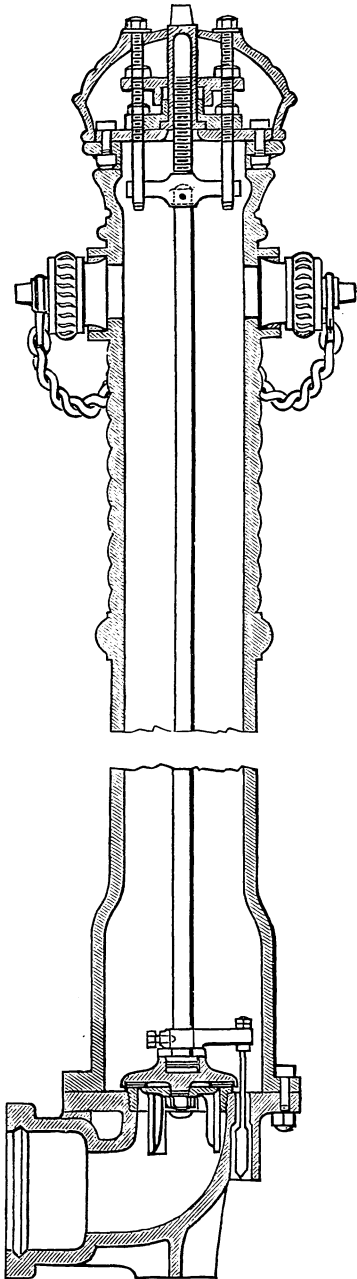
A highly successful test of the largest armor piercing shells was held at the naval proving grounds, Indian Head, on the 5th inst. The shells were the product of the Carpenter Steel Company, and represented a lot of about 250 which the Government has contracted to purchase from that concern. The tests were under the personal supervision of Commodore Sampson, chief of the Bureau of Ordnance. Each shell weighed 850 pounds, and is intended for operations against armor. Such shells do not contain bursting charges, but cause damage by the force of impact alone. The shells were discharged against one of the several Creusot plates recently bought by the Navy Department for experimental purposes.

Only two shells were tested. The first had a velocity of 1300 feet a second. It penetrated 16 inches of plate and backing, rebounded and was found to be only slightly distorted in body. The second shell had a velocity of 1325 feet a second. It went through both plate and backing and fell 9 feet in rear of the target. It was practically undeformed when examined. In the contract requirement shells of this large caliber must, to be acceptable, go through plates without serious distortion or break. Both shells used met the requirements in a satisfactory manner, and the lot which they represent will be accepted.

Much study is now being devoted to the question of oil for fuel for ocean steamships. The "James Brand," during a recent voyage across the Atlantic, used petroleum for three days and found it satisfactory in every way. The oil was fed to the furnace by means of jets of steam. The "James Brand" is of 3780 tons register, 345 feet long, 43½ feet beam, 29 feet deep, and is furnished with triple-expansion engines. The experiment will be continued, and if found to be of advantage petroleum will be used exclusively.

The Kennedy Fire Hydrant.

The sectional drawing here presented shows very clearly the component parts of the fire hydrant made by the Kennedy Valve Mfg. Company of 52 Cliff street, New York. The guide, stuffing box and cap are so arranged that in case of obstruction in the valve, or for necessary repairs to the main or piston drip valve, they can be removed out of the top of the hydrant, leaving the standpipe in the ground, and can be replaced in a few moments, thus obviating the necessity of digging up the standpipe. The hydrant has a positive drip, con-



The Kennedy Fire Hydrant.

sisting of a very deep piston valve, the upper part of which has grooves to allow the water in the standpipe to flow through after the main valve has been closed. It is self-cleansing, for each time the drip is opened or closed it removes by its own action any obstruction or refuse that may have lodged in the drip. The hydrant will not freeze up where fair drainage exists, for the moment the main valve is closed all the water in the standpipe flows through the drip. The valve seats, bushing of the drip outlet and the wrench nut on top of the hydrant, are made of gun metal.

The Bethlehem Hammer.

[With Supplement.]

In 1888 the Bethlehem Iron Company of South Bethlehem, Pa., one of the oldest and one of the most famous producers of steel in the United States, decided to erect a plant to manufacture the most powerful modern guns and the heaviest armor and forgings for the navy, and to place at the service of private engine builders and shipyards the equipment for production of the highest grades of heavy forgings. Recognizing the fact that the requirements of the future were likely to grow be-

the most ponderous tool of its type in the world.

The accompanying plan indicates the location of the different buildings in the new department. The older works, with its blast furnaces, Bessemer department, rail mill, billet train, puddle mill, machine shops, foundry and offices, extending in a long series to the left, are not shown on the plan.

The forging, armor and gun plant consists, first, of the open-hearth department, in which there are located four open-hearth furnaces, rated at 10, 20, 40 and 40 tons capacity, so that the casting capacity is 110 tons. These furnaces, which are placed in one line, have been built with extraordinary care, and their design and construction has

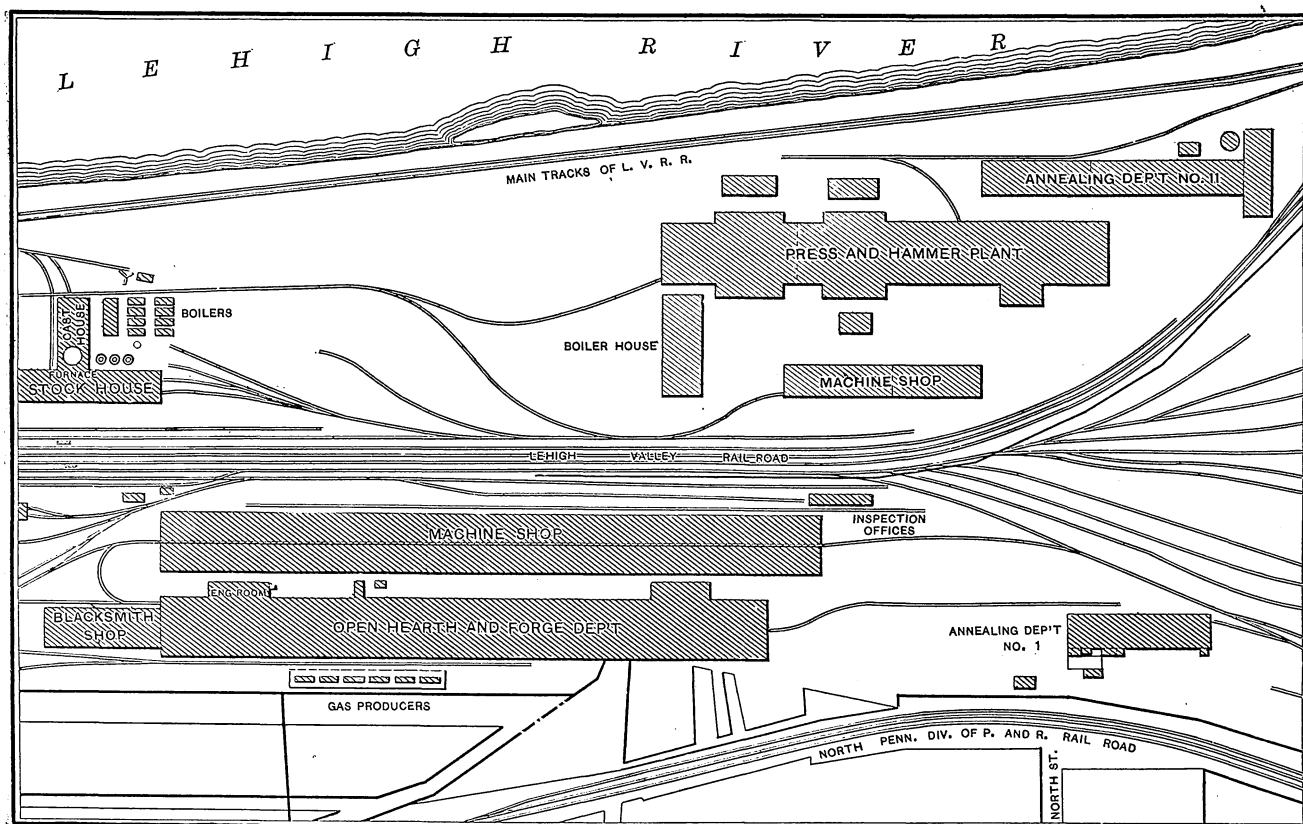
Company can meet any demands which may arise, thus making our builders independent of foreign producers.

The open-hearth and forging department is housed in a building 1155 feet long by 111 feet wide, with annexes for engines, gas producers, &c.

For forging and bending armor, the company have installed the plant shown in the plan nearer to the Lehigh River. It is 846 x 116.5 feet. It is here that is located the famous

125-Ton Hammer,

engravings of which we present in our supplement, together with a photographic reproduction of the full-sized model, which is a part of the exhibit of the Bethlehem Iron Company in the



Open-Hearth and Forge Department, 1155 x 111 Feet.—Machine Shop, 1250 x 116 Feet.—Press and Hammer Plant, 846 x 116.5 Feet.—Annealing Department No. 2, 496.4 x 63.2 Feet.—Machine Shop No. 3, 368.4 x 63.1 Feet.

PLAN OF THE ARMOR AND GUN PLANT OF THE BETHLEHEM IRON COMPANY.

yond the capacity of the most powerful equipment of the day, the plant was laid out on a scale of magnitude not approached until then. The general design, down to the details of every machine and furnace, was made by John Fritz, to whose genius, backed by the support and the encouragement of the Board of Directors and the officers of the Bethlehem Iron Company, is due the creation of the great plant.

We have from time to time recorded some of the achievements of the ordnance and armor plate department of the Bethlehem Iron Company, but nothing has been published concerning the plant which bore the seal of authority and was accurate, except a brief description in a paper by W. H. Jaques, ordnance engineer, in the "Proceedings of the U. S. Naval Institute," Volume XV, No. 4. Through the courtesy of the Bethlehem Iron Company we are in a position to present some details and to place before the readers of *The Iron Age* drawings of the famous hammer,

elicited the highest praise from some of the most eminent European metallurgists in their visit to the plant. A 7000-ton Whitworth fluid compression plant is provided, the press being commanded by a hydraulic crane, while hydraulic rams in the pit are employed to handle the ingots. The casting pit proper is controlled by two traveling cranes operated with compressed air.

This department contains, also, two Whitworth forging presses, rated at 2000 and 5000 tons, each being supplied with two overhead traveling cranes and equipped with two furnaces. Two Whitworth pumps supply the power, while a compressed-air plant is a part of the installation for the cranes. This forging plant is employed principally for the heaviest guns and shafts, a specialty being made of hollow-forged engine shafts. Formerly, large shafts for some of the great stationary and marine engines used in this country had to be imported from Europe. Now, with their facilities, the Bethlehem Iron

Transportation Building of the World's Columbian Exposition.

We have been told by foreign engineers that they were inclined to look on smilingly when the model was being erected, regarding it as a characteristic American piece of bravado. But when, almost over night, some of the splendid products of the forge were quietly deposited near the imitation tool, their smiles vanished and a serious and appreciative study of the work followed.

The Foundation.—The building of the foundation was in itself a very great undertaking. Piles 35 to 40 feet long, spaced 2½ to 3 feet, were driven in the bottom of the pit. Upon them were placed layers of planking covered with wood shavings from a planing machine. The first course of cast-iron blocks was laid, there being eight in all. A series of layers of 2-inch planking upon which cork had been nailed followed, the total thickness being 18 inches. Then came a course of ten steel

bars, forged from ingots, with the ends left in the rough, as indicated in the engraving. Plank and oak was laid on top of them. Then came a course of four cast-iron blocks, and then layers of plank and cork, and finally six courses of cast-iron blocks. Each of these,

piston, piston rod and tup. It is single acting, the diameter of the steam cylinder being 76 inches, while the stroke is 16 feet 4 inches, which can be increased to nearly 20 feet. The working pressure is 120 pounds. The cylinder is cast in three sections, as shown, the

served, are made in two sections, each of the upper sections weighing 48½ tons, while the two lower sections weigh 107 tons each, the guides being estimated at 75½ tons. The base plates are 10 x 8 feet, each weighing 56 tons.

Details of the piston are shown in Figs. 1 to 4, together with a larger drawing of the entablature and of the main valve and its operating mechanism. The piston rod is encircled by an inside split nut, C, Fig. 1, upon which is shrunk a forged steel band, D, which is kept from turning by the screw E. The piston proper, A, has steel packing rings, B. A filling to save steam is put into the lower part of the cylinder, the arrangement being such that a second inlet valve is provided.

The section of the entablature, Fig. 3, shows the main 21-inch valve, whose ports have been shaped in the manner indicated in order to prevent leakage by scoring. There are 20 inlet ports, 15 inches high.

The main valve is commanded by an auxiliary cylinder, Fig. 4, above which is mounted a small cylinder to balance the valve. The motion of the auxiliary valve is commanded from the pulpit, through the two rods, which, through the system of levers shown, actuate the slide valve. The lever *a*, which is operated from the pulpit by wireropes, has its shorter arm attached directly to the rod *b* of the operating slide valve. As soon as the piston of the operating cylinder has risen to a certain point, it carries with it the lever system *c*, *d* and *e*, the latter encircling *a*. It at once acts upon the rod *b* and carries the slide valve back to its original position, cutting off the supply of steam. The spring arrangement shown is provided to avoid too rapid opening, and there is a check in the exhaust to stop vibration. The whole arrangement works admirably, the movement of the hammer being under perfect control, the slightest touch of the operating lever making itself felt.

In order to retain the tup in any position desired, a series of notches are provided for in the guides by which the tup can be locked at any point and from which it can be released from the pulpit through the system of levers indicated in the drawing.

The exhaust ports in the main cylinder shown in the engravings keep the piston from rising too high, the upper part of the cylinder acting also as an air cushion.

The upper cast-iron part of the tup is attached to the lower steel section by shrinking two rings over semicircular lugs cast on the two parts. On the left leg of the hammer is mounted a hydraulic ram for handling the knife to shear off the ends from the armor plates. It will be observed that the tracks in the immediate vicinity of the hammer are inclined toward it to facilitate the handling of the forgings.

The total height of the hammer above the floor level is 90 feet and its width 38 feet.

The hammer is backed by four large heating furnaces, two on either side, while the manipulation of the masses to be forged is done with two 150-ton overhead traveling cranes running on very heavy lattice-girder tracks, resting on posts 17 feet 2½ inches high. The cranes have a span of 40 feet 9½ inches and a total travel of 144 feet. The traversing movement is worked by compressed air, while the lifting and lowering, within a range of 10 feet, is done by a vertical hydraulic cylinder, with provisions for turning.

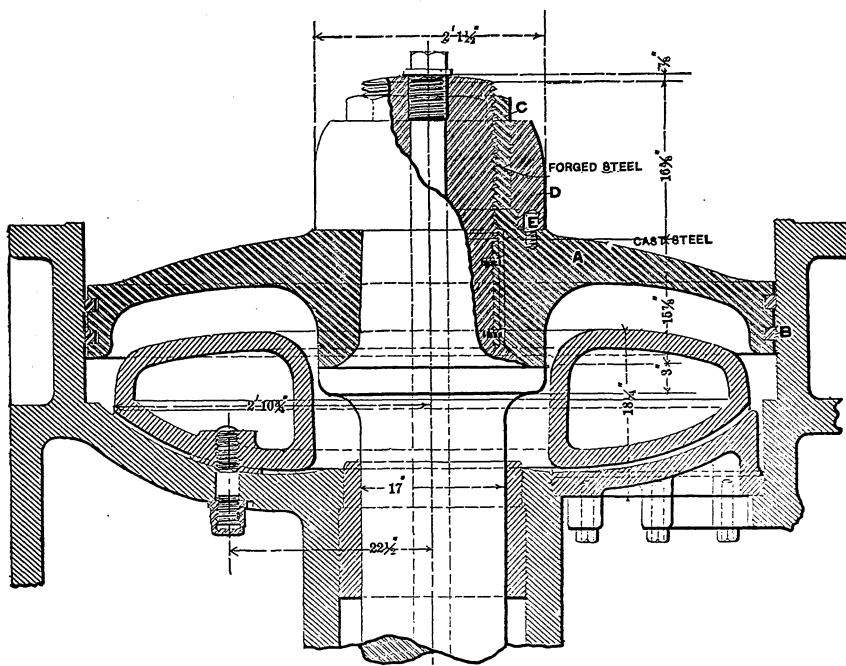


Fig. 1.—Section of Piston.

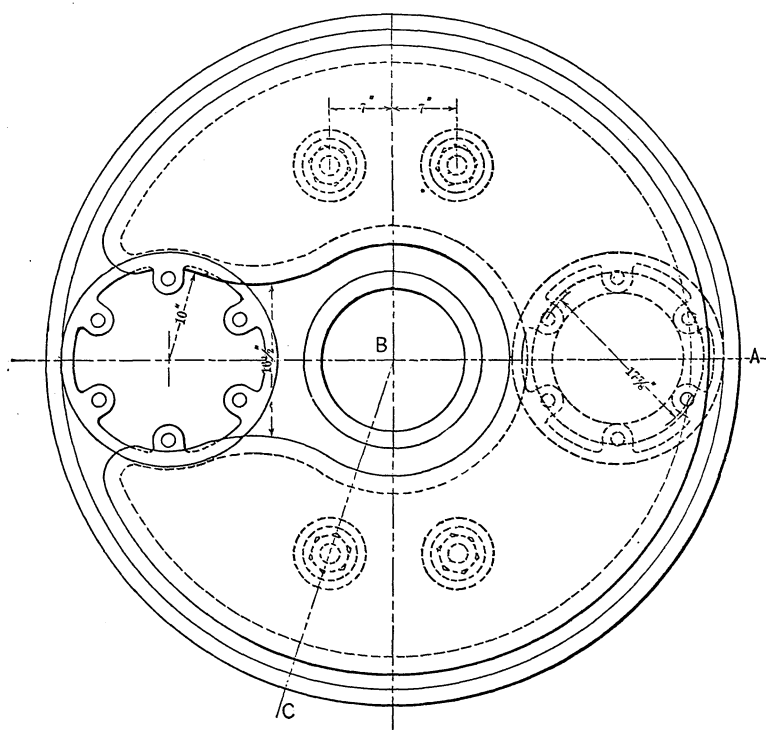


Fig. 2.—Plan of Filling.

THE 125-TON BETHLEHEM HAMMER.

with the exception of the two top courses, which weighed 54 tons, had an estimated weight of 70 tons. The shoes weigh 60 tons each and the anvil die 30 tons. It is estimated that the total weight of metal in the anvil blocks is 2150 tons.

The hammer is rated at 125 tons, that being the combined weight of

weight of the top section being 15,249 pounds, while that of the middle section is 20,033 pounds, and that of the lower section is 21,005 pounds. The entablature, which weighs 60½ tons, is so constructed that it is possible at short notice to place a second valve into position, on the left in our drawing, should it be required. The legs, it will be ob-

The Forging and Bending Presses.

In the same shop the famous 14,000-ton press is approaching completion, the largest tool of its class in the world. It will be principally employed for rough forging armor plate, the hammer to be used for finishing. It has two hydraulic cylinders, 50 inches in diameter, so that taper forging can easily be done without the use of special dies. The dies, forging blocks and other tools are manipulated by hydraulic power. The heads are so large that they were made in two pieces, the two together weighing 386 tons. In order to hold them together, 18 steel bolts, 6 inches in diameter, were heated to such a temperature that when they were cooled after screwing home they were under tension of 20,000 pounds per inch. The four great bolts were 46 feet long and 26 inches in diameter. The hydraulic pressure is 7000 pounds to the square inch, supplied by pumps rated at 16,000 horse-power, designed by John Fritz—E. D. Leavitt of Cambridgeport being consulting engineer. The engines, which run at 80 revolutions, are vertical, with 90 inch cylinders and 50-inch stroke, while the pumps are horizontal, 11-inch cylinders and 45-inch stroke. The pumps were built by the Bethlehem Iron Company, while the engines came from the shops of the I. P. Morris Company of Philadelphia. The detached boiler house, shown in the plant, contains 32 Leavitt boilers which were designed for 150 pounds working steam pressure.

On the other side of the hammer is the 7000-ton bending press, with lifting cylinders, it being possible to control its motion to $\frac{1}{16}$ inch. It is commanded by a 75-ton overhead crane on either side moving to and from the press. In close proximity is the pulpit, admirably arranged to control the working of the press and the translation of press and hammer cranes. The pumping plant, and the compressors for the cranes and four producers are located near the press. There is room in the same large building for the heavy plate train which will ultimately complete the equipment.

The tempering house alongside the press and hammer shop contains at one end a vertical heating furnace capable of taking gun tubes or shafts 55 feet long, and the oil bath for tempering the same. In the same shop are four furnaces for heating armor plates, and a large tank for oil tempering them, commanded by an overhead traveling crane. The surface of the oil is sprayed to prevent its taking fire. Eight furnaces for treating armor plates by the Harvey process complete this part of the plant.

The armor-plate machine shop, which is on the other side of the hammer shop, is 368.4 x 63.1 feet, and is commanded from end to end by overhead traveling cranes. It contains three Schneider saws, a large planer, two side planers, drill presses, a shaping machine for edges, a large planing machine, a Sellers rotary planer and other tools.

Probably the most impressive of all the buildings is the great machine shop, which is 1250 feet long, or nearly $\frac{1}{4}$ mile, and is 116 feet wide. It is traversed from end to end by railroad tracks, and is commanded by two 75-ton and one 30-ton pneumatic crane. It contains lathes, planers, boring mills, slotters, shapers, &c., of which a number are of exceptional size and are prepared to do any class of work. Among them is a planer, specially designed by Mr. Fritz,

which in magnitude bears the same relation to tools of its class as does the great steam hammer. It has a capacity of 13 x 13 x 50 feet 10 inches. A large

Iron Company, for the following statement of notable forgings produced and shipped. It embraces work for the army, the navy and for private persons. As

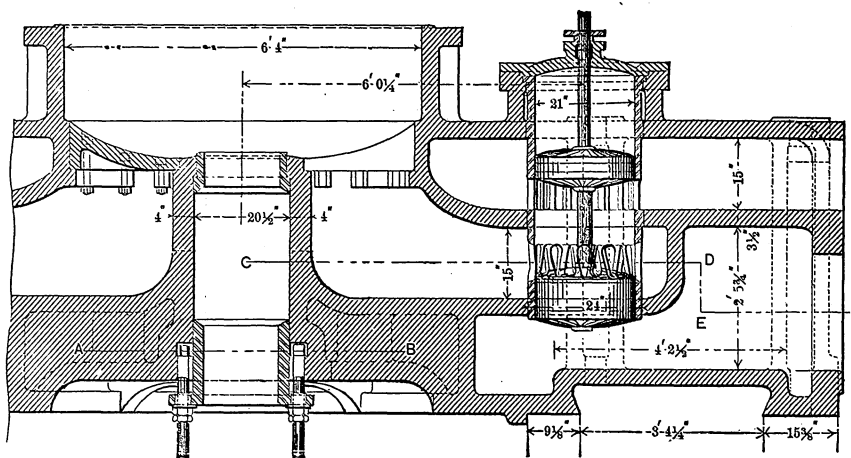


Fig. 3.—Section of Entablature.

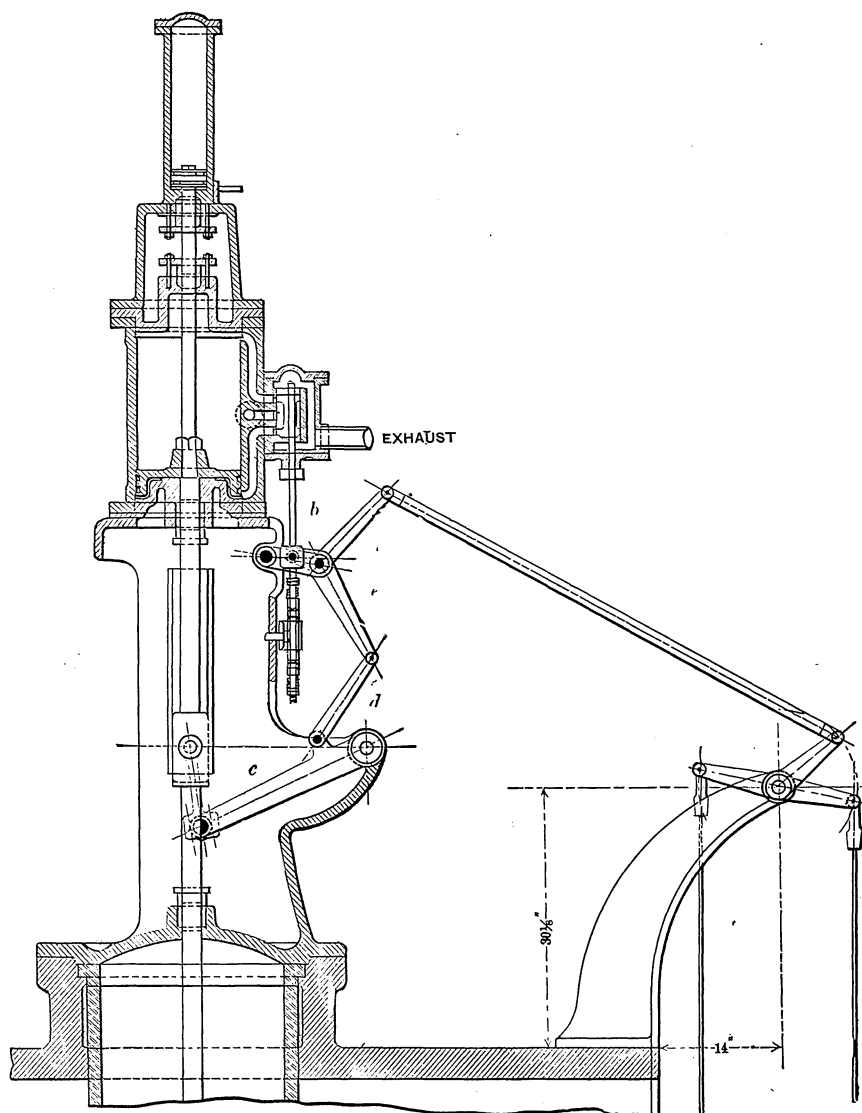


Fig. 4.—Valve Mechanism.

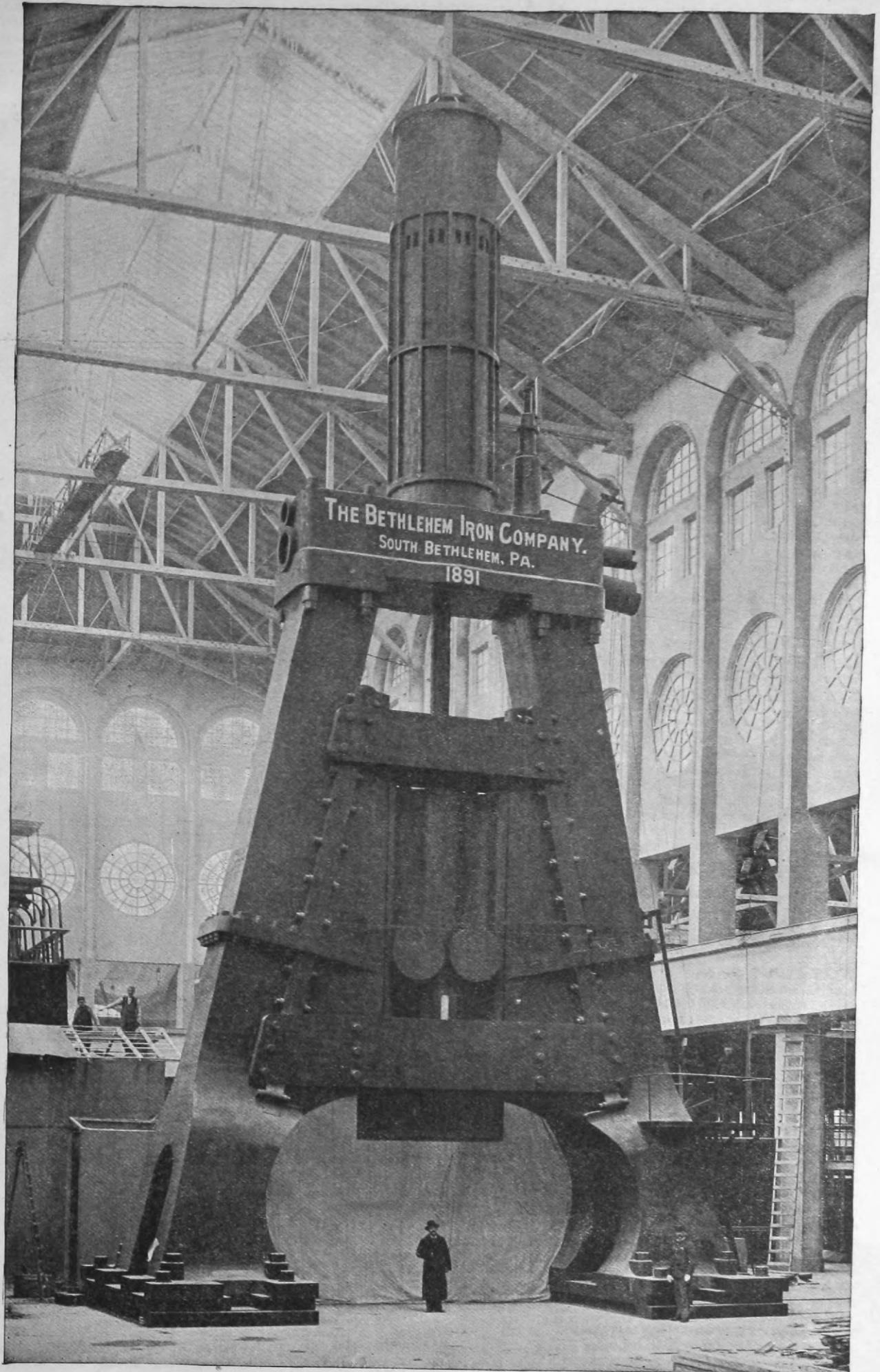
THE 125-TON BETHLEHEM HAMMER.

amount of machinery is now being put in place for gun finishing.

Notable Forgings Made.

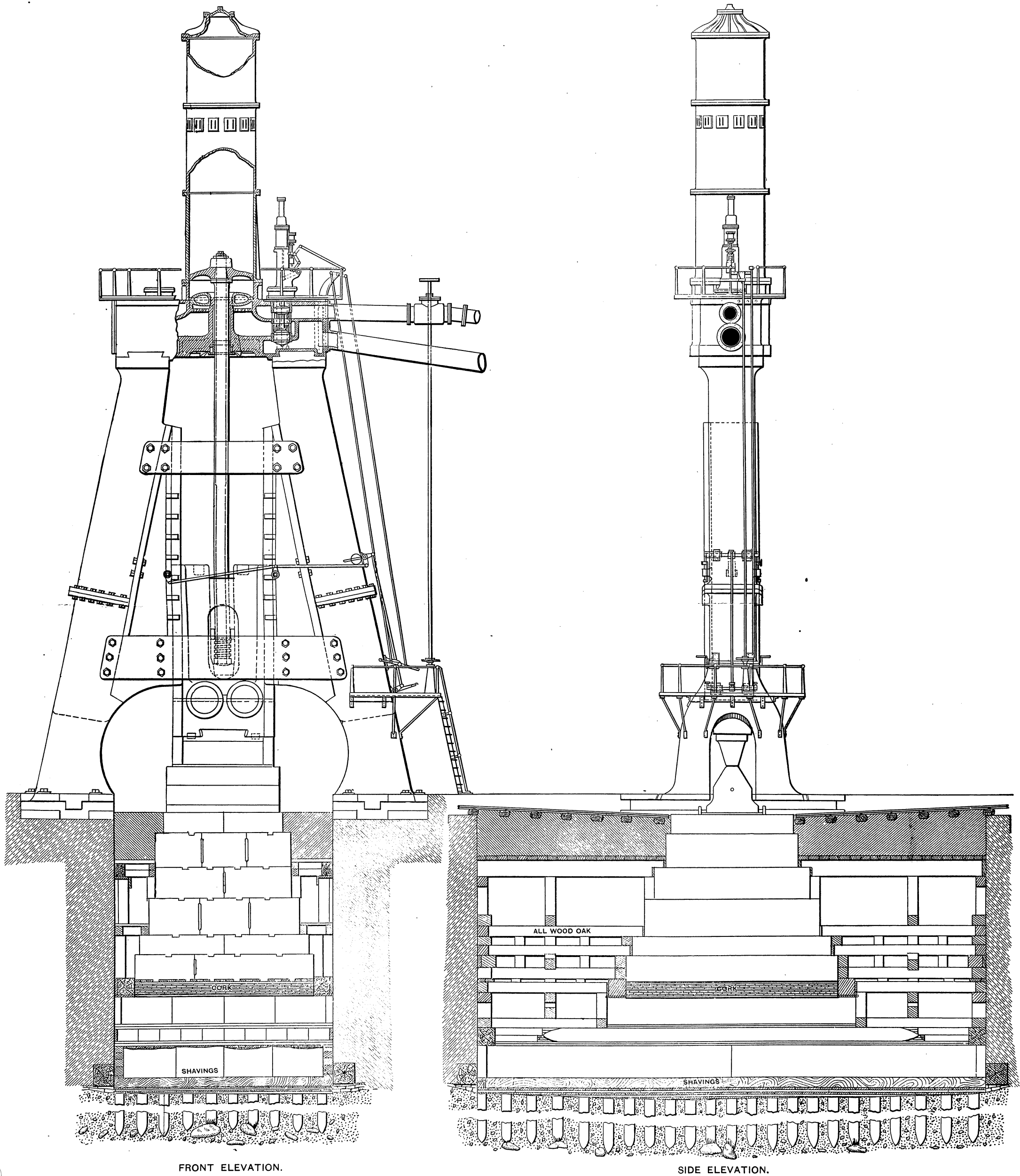
We are indebted to Robert P. Linderman, president of the Bethlehem

illustrative of the impressive character of what has been already done, we reproduce a photograph showing a train of cars about to start across the continent with the barbette plates for the United States vessel "Monterey," then



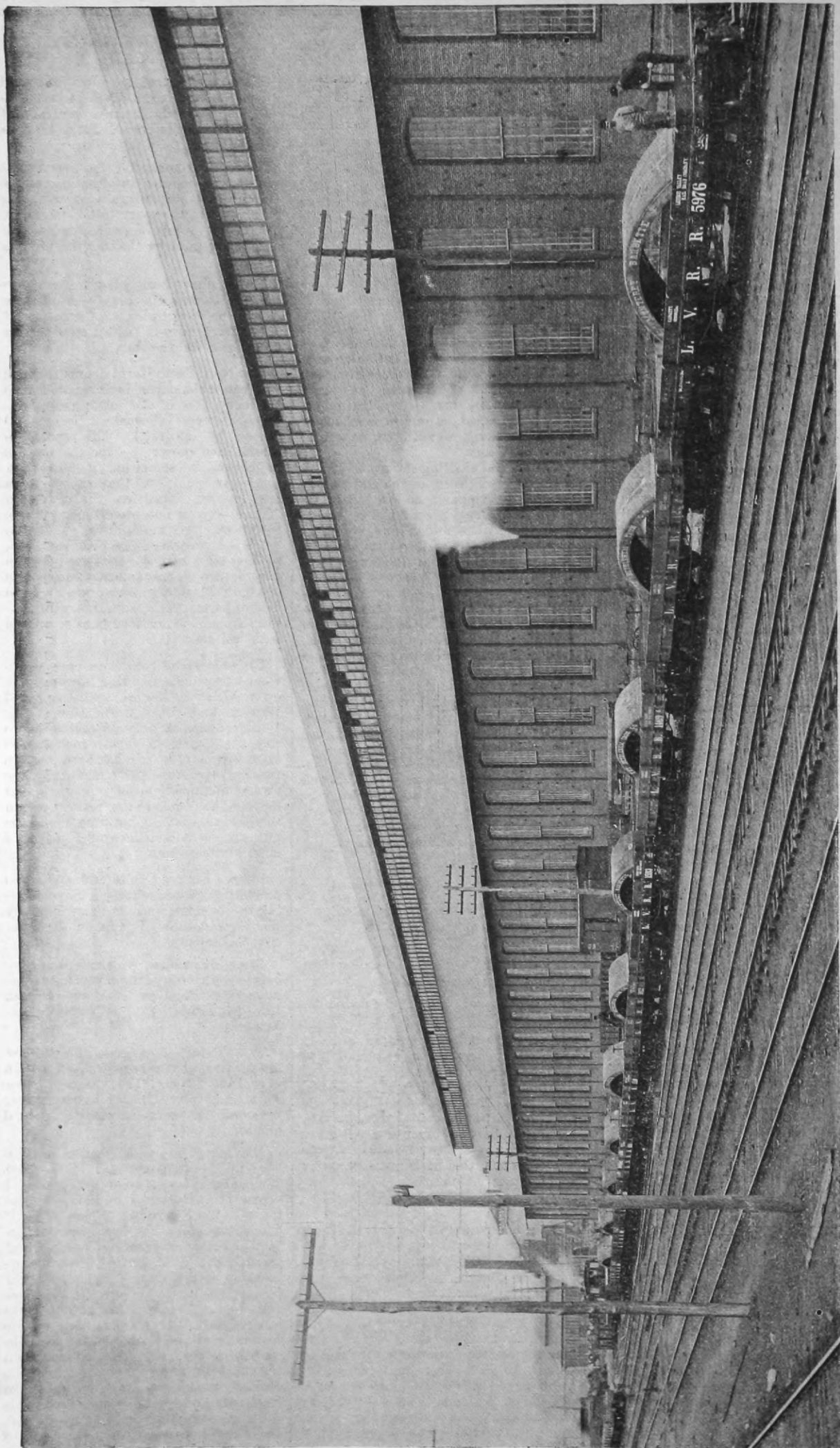
THE 125-TON BETHLEHEM HAMMER.

From a Photograph of a Model at the World's Fair.



THE 125-TON BETHLEHEM HAMMER AND ITS FOUNDATION.

Designed by JOHN FRITZ, Bethlehem Iron Company.



A SHIPMENT OF ARMOR PLATE BY THE BETHLEHEM IRON COMPANY, SOUTH BETHLEHEM, PA.

building at San Francisco. It may be of interest to add that the building in the background is a part of the great machine shop.

Gun Forgings.—The following sets of larger gun forgings have been furnished to the United States Army and Navy prior to June 1, 1898:

No. of sets.	Caliber, inches.
6.....	13
19.....	12
45.....	10
52.....	8
57.....	6
39.....	5
42.....	4

Shafting.—The line shafting, cranks and larger engine forgings have been furnished for the following ships of the United States Navy: "Indiana," "Maine," "Philadelphia," "Columbia," "Cincinnati," "Bancroft," "Massachusetts," "Monterey," "New York," "Minneapolis," "Raleigh," "Oregon," "Newark," "San Francisco," "Olympia," "Marblehead," harbor defense ram "Katahdin" and torpedo boat No. 2. Work is now in progress on shafting for battle ship "Iowa" and armored cruiser "Brooklyn."

Armor Plate.—The following are the principal lots of heavy armor plate furnished to date:

Two barbettes, "Monterey," 11½ and 13 inches thick, weighing 156 tons.

Two barbettes, "Amphitrite," 11½ inches thick, weighing 148 tons.

Two barbettes, "Puritan," 14 inches thick, weighing 255 tons.

Two barbettes, "Maine," 12 inches thick, weighing 414 tons.

Two turrets, "Terror," 11½ inches thick, weighing 193 tons.

Diagonal armor, "Indiana," 14 inches thick, weighing 242 tons.

Diagonal armor, "Massachusetts," 14 inches thick, weighing 242 tons.

Diagonal armor, "Oregon," 14 inches thick, weighing 238 tons.

Reboubt armor, "Texas," 12 inches thick, weighing 396 tons.

Of the armor now in course of manufacture the following is the most notable:

Two barbettes battle ship "Indiana," 17 inches thick, weighing 810 tons.

Two barbettes battle ship "Massachusetts," 17 inches thick, weighing 810 tons.

Side armor battle ship "Indiana," 18 inches thick, weighing 650 tons.

Side armor battle ship "Massachusetts," 18 inches thick, weighing 650 tons.

Among the larger forgings furnished to private parties we may mention several hollow forged shafts for the Old Colony Steamship Company's steamers "Puritan," "Pilgrim," "Plymouth," and the new boat now building. The Bethlehem Iron Company also built the shaft for the Ferris Wheel at the World's Fair, which is hollow forged, 45 feet long, 32 inches outside diameter and 15½ inches hole.

The World's Fair Exhibit.

A number of highly interesting exhibits are made by the Bethlehem Iron Company. In armor there are shown the first experimental plate made in 1891 of soft steel, 6 feet long, 4½ feet wide and 11½ inches thick, weighing 5.7 tons; an experimental nickel-steel, case-hardened 10½-inch plate, 8 feet long and 6 feet wide, weighing 9.3 tons, and a nickel-steel barrette plate for the battle ship "Indiana," 17 inches thick, 12 feet 1 inch long and 8 feet 4 inches wide, weighing 31.2 tons; a

nickel-steel ventilator for the "Puritan," 6 inches thick, 4 feet 1 inch high, having an outside diameter of 7 feet and an inside diameter of 6 feet and weighing 9.1 tons.

A 12-inch breech-loading navy rifle, which was assembled at the Naval Gun Factory, is shown, which has a length of 36 feet 9 inches and weighs 45.2 tons. A smooth-forged tube for a 13-inch navy rifle is shown, weighing 26.3 tons, and a jacket of the same caliber 17 feet ½ inch long, having an inside diameter of 1 foot 11½ inches and an outside diameter of 3 feet 2½ inches, weighing 25.4 tons; a trunnion hoop for a 12-inch army rifle weighing 2.3 tons, and gun hoops of various lengths and diameters weighing in the aggregate 45.9 tons. To show the size of the ingot from which armor plates are made there is a wooden model of an ingot 8 feet 6 inches wide, 52 inches thick and 18 feet high, representing an ingot weight of 112½ tons. An actual ingot, fluid compressed, 54 inches in diameter and 15 feet long, is exhibited, its weight being 48½ tons.

The largest shafting shown is a spare shaft for the Pilgrim of the Old Colony Steamship Company, hollow forged, 39 feet 5 inches long, 2 feet 3 inches outside diameter, with a 9-inch hole, weighing 39.4 tons. Another hollow-forged shaft, black as coming from the forge, is 66 feet 11 inches long, 1 foot 8 inches in diameter, with an 8½-inch hole, weighing 24.6 gross tons. A single-throw crank shaft for the United States cruiser "Minneapolis," finished, weighs 4 tons, being 9 feet 7½ inches long over all, and having a diameter of shaft of 1 foot 4½ inches. A double-throw crank shaft for the Pacific Mail Steamship Company of Sidney, built up, weighs 23½ tons, being 22 feet 6 inches long over all, and with a diameter of 1 foot 5 inches.

On rail steel, an instructive comparison is made of drop tests on a 70 pound section, with a ton ball, the test piece being placed on supports 3 feet apart. The effects of higher and lower carbon are shown in the following results:

At 10-Foot Drop.

Carbon.	Deflection.
0.40	1½ inches.
0.65	1½ inches.

At 15-Foot Drop.

Carbon.	Deflection.
0.40	2¾ inches.
0.65	1 15-16 inches.

At 20-Foot Drop.

Carbon.	Deflection.
0.40	3¾ inches.
0.65	2¾ inches.

There are also a number of tests showing the results of 0.10 and 0.50 carbon steel splice bars.

Altogether, the exhibit of the Bethlehem Iron Company is not alone one highly creditable to the company in question, but does much to redeem the American iron and steel industry from the reproach that it is not adequately represented at Chicago.

The contractor's trial of the new protected cruiser "Columbia" will take place on Wednesday, July 26. The "Columbia," which is still at Cramp's shipyard, is the first triple-screw vessel built by the Government. She will be docked at League Island, and while there will be examined by the Inspection Board, of which Admiral Belknap is president, her port and starboard screws will be placed in position, and she will be cleaned and painted preparatory to her preliminary trial. She is required to make 21 knots an hour.

THE WEEK.

The receivers of the Reading road have obtained authority to issue \$3,743,150 of certificates, the protests of some representatives of bond holders being overruled by the court.

A royal commission has been appointed to inquire into the causes of the present agricultural depression in England and to report to the House of Commons what means should be adopted to improve the condition of the industry.

Rumors have been given currency to the effect that a Maltese stoker off duty closed the watertight compartments of the "Camperdown" of his own accord and thus saved the ship.

The New York *World* claims to have made an exhaustive investigation into the condition of the cotton crop, having collected information from 300 centers by telegraph. The reports as summarized show: 1, That the acreage in cotton is somewhat greater than last year, and, 2, that except in a few favored localities, the condition of the crop is not promising. There has been too much rain and too much cool weather since planting time, so that the crop is backward by ten days or two weeks, and in some points of the South insects are working a good deal of harm. The reduction will possibly amount to one-fourth, as compared with last year.

Under stress of circumstances a somewhat exceptional building has been put up by W. D. F. Manice, at the corner of William and Pine streets, New York. The frontage is only 16 feet 3 inches and the depth 57 feet 5 inches, and upon this narrow strip has been built a ten-story structure 135 feet high. The owners of the adjoining properties had declined to purchase the real estate on the ground that no building could be put up on it which would justify a large purchase sum.

Fifteen hundred poles and 450 miles of overhead wire are to be removed during the current year in New York by the Metropolitan Telephone & Telegraph Company.

Press dispatches, which will be received with considerable skepticism, announce that the Iron Mountain vein, at Iron Mountain, Mo., is virtually exhausted.

Four 13-inch guns needed for the new battle ships have been finished at the Washington Navy Yard. Each of these ships will carry four of these guns, mounted in pairs, in turrets forward and aft.

It is stated in the daily press that the French Government has authorized the construction of a new and powerful cruiser, to be nearly a duplicate of the United States cruiser "New York." The information has been received in United States naval circles with marked satisfaction. It is the first acknowledgment by a first-class foreign power of the superiority of United States naval construction. It will be noted, naval officers say, that the building of the new navy of the United States began in earnest as late as 1885. In less than ten years the naval constructors of the United States Navy have succeeded in developing a type of war ship which is deemed worthy of copying by France, and France possesses her own schools of naval architecture.

The Iron Age

New York, Thursday, July 13, 1893.

DAVID WILLIAMS, - - PUBLISHER AND PROPRIETOR.
CHAS. KIRCHHOFF, - - EDITOR.
GEO. W. COPE, - - ASSOCIATE EDITOR, CHICAGO.
RICHARD R. WILLIAMS, - HARDWARE EDITOR.
JOHN S. KING, - - - BUSINESS MANAGER.

The Index of *The Iron Age*, Volume LI, January-June, 1893, is now ready and may be obtained on application to David Williams, publisher, 96-102 Reade street, New York; or to 220 South Fourth street, Philadelphia; Room 509 Hamilton Building, Pittsburgh; 59 Dearborn street, Chicago; Rooms 22-24 Pickering Building, Cincinnati; Bank of Commerce Building, St. Louis; 146 Franklin street, Boston, and 312 The Cuyahoga, Cleveland.

The World's Fair.

Every returning visitor to the World's Fair is becoming an active missionary in his home in behalf of that grand undertaking. The influence of this labor of love can hardly be overrated. The enthusiasm of a friend or an acquaintance is catching. It is far more convincing than columns of cold type. Doubts are dispelled, objections are quickly overcome and the conviction is reached that ways and means must be carefully studied to settle the question whether a visit is feasible. Questioning concerning some special interests put to the returning traveler often fails to bring satisfactory information and strengthens the belief in the necessity for personal inspection.

We may confess that we have been taken by surprise by the unanimity of the enthusiasm aroused with persons differing widely in temperament and in tastes. A good deal of downright wicked work on the part of some of the daily newspapers, notably in the East, is being undone now by those who come home to relate their experience. Whatever may have been the shortcomings during the early days following the opening of the fair, they are now completely removed. The exhibition is a harmonious whole, beautiful beyond anything yet created by man in this country, and in grandeur surpassing any similar attempts at home or abroad. Architecturally and artistically the structures of the White City will prove a revelation and are likely to cause a reaction to a purer and chaster taste in our public buildings and private dwellings. We look forward to as decisive an influence upon the taste of the people as was that created by the Centennial Exhibition. Gaudy frills will not sell as well as they have done, and it will be a wise course on the part of manufacturers of goods ornamented in any way to closely watch developments in this direction.

Until now the visitors to the fair appear to have been drawn from a moderate distance of Chicago, while the majority of those who have traveled further than 200 miles are well-to-do people. From a study of those in attendance and talks with many people we are convinced that the rush has really not begun yet. That it is coming we have little doubt. Lower rates of fare, the steadily growing interest, and the fact that the vacation season is at hand, will all contribute to swelling the attendance. It is beginning to be understood, too, by the financially timid, that the tales of extortion rest on a very slim foundation.

Experts who expect to be overwhelmed with novelties in their own special branch will be doomed to disappointment. Our technical press is too vigilant and too enterprising to permit of many startling revelations. But in these days of specializing, the manufacturer, the business man and the engineer can spend many hours profitably in an inspection of exhibits illustrating recent progress in cognate industries.

But after all the main object and the principal achievement, from an educational point of view, of this like every exhibition, is the enlightenment which it brings to the masses, whose range of vision it expands, whose mental activity it stimulates and whose tastes it elevates. The World's Fair, which is Chicago's glory, is becoming the pride of every American, and is bound to have a wonderfully invigorating effect upon the people.

The Economy of Special Tools.

The modern processes of manufacture have been reduced in many cases by sheer financial necessity to such systematic arrangement as to make possible the production of a multitude of articles far within their cost by the older methods. The milling machine, the turret lathe and the screw machine are daily turning out by hundreds what the lathe and planer can only make by tens. And yet the relative economy of these new tools is to the greatest degree dependent upon the number of pieces to be made. It is the wise man who knows when, and when not, to prepare special tools, jigs and templates, so that, notwithstanding their increased first cost, his completed article may be more cheaply made. Likewise, the minute division of labor, that makes of every workman a specialist and an expert, is warranted only by multiplicity of similar pieces and operations. In the manufacture of watches, for instance, this is carried out to a degree that would have opened wide the eyes of a manufacturer 25 years ago. At the World's Fair, in the exhibit of the American Watch Company, is displayed a specially designed continuous lathe, so ingenious in its construction and so accurately timed in its movements that the piece fed in at one end is clamped in a chuck

operated upon by a single tool, released at just the instant when an automatic finger has grasped it, is swung around to another chuck, dropped by the finger as soon as caught by the chuck, operated upon by another special tool, and then sent along on its journey to successive tools in the same general machine. This masterpiece of machine design doubtless effects a saving in the cost of the finished pieces that pays a handsome interest upon its first cost, and yet what economy could there be in the use of a similar, but stronger, machine in the ordinary machine shop. Surely the end must justify the means, and one of the first principles in the introduction of such a machine must be to determine its interest account per piece made, and add this to the actual cost of the piece, in deciding upon the economy of its use. A machine for ordinary manufacture that cannot be almost continuously employed must show marked economy in its operations to prove a financial success. Nevertheless, when the articles made are great in numbers, the skill acquired by the workman who performs only a single operation, and the perfection of result with reduction of time attained by the special tool, render the entire process systematic, decrease the cost and improve the quality of the completed piece.

Popular Disinclination for Manual Training.

In a recent conversation on manual training for boys, one who is interested in the management of a small trade school complained bitterly of the unexpected difficulties he met with in obtaining the consent of parents for their boys to attend the manual training classes provided for them. The school in question is designed to cultivate a taste for handicrafts in the younger lads of the eastern district, New York. The idea is to prepare the boys for eventually joining one of the more advanced trade schools with a view to entering some useful and remunerative mechanical trade, such as carpentry, painting, plumbing, sheet metal working, &c. Instruction is gratuitous, and the hours are so arranged as not to interfere with the daily work of boys who may be in other employments. Everything is done to interest them by providing lectures and entertainments, in addition to the practical instruction. But notwithstanding these inducements the parents, although mostly in the poorest circumstances, do not care to have their children trained for manual labor. Their preference is that they should learn bookkeeping, or in some other way be fitted for clerkships or kindred occupations. There is a foolish and mistaken notion abroad, particularly among the poorer portion of the community, that there is a sort of "gentility" surrounding work in an office or a store which is not to be found in manual labor at the bench or the lathe. These silly people's ambi-

tion is to see their boys dressed in black coats, with nice white hands and linen instead of bearing the marks of honest and ennobling labor in a manual calling. They are not far-sighted enough to look ahead into the future prospects of either kind of work, and it is a difficult matter to persuade them that the best interests of their children mostly lie in the opposite direction to that toward which they incline.

Parents cannot understand that in training boys as mere writing machines or counter servers they are launching them on a market which is and always will be overstocked, while in fitting them for skilled labor they give them an education which, provided their moral and mental qualities are reliable, will insure for them steady and well-paying employment in the present, with the prospect of early independence and a position, when they have reached the upper rounds of their trade ladder, to which not one in ten among the more stylishly appareled crowd of clerks can ever aspire. The pecuniary advantages, present and future, of the skilled workman in such trades as are taught in manual training schools are in this way infinitely superior to those attaching to the average run of clerkships. But beyond and above this consideration there is, when rightly understood, a dignity and an ennobling character about the labor of the hands which recommends it to all honest and right-thinking minds as a thing to be admired, and which does not exist to the same degree in the so-called genteel occupations to which so many misguided youths of the poorer classes are devoted. "The dignity of labor," although a term too often prostituted to unworthy purposes by demagogues and agitators, so that to some noses it has acquired a stale and canting odor, is yet as true a phrase as ever gained currency. This grand expression needs to be put up in its rightful position in the sight of all the rising generation who may be inclining to bow at the shrine of kid gloved and stiff-collared gentility to the disparagement of the claims of honest and heaven-blessed manual labor.

Two of the ten great turbine wheels, of 5000 horse-power each, which will constitute part of the immense power plant at Niagara Falls, are now nearing completion at the I. P. Morris Works, Philadelphia. The main sluice gates, which are to admit the water from the inlet canals to each wheel, are also being manufactured in Philadelphia, at William Sellers & Co.'s, Incorporated, which firm are also building the 50 ton traveling crane to be used in the erection and management of the ten wheels. The main building, the power house of steel, which is being constructed by the Pennsylvania Steel Company, near Harrisburg, is also ready for erection.

In the *Scientific American Supplement* is printed a memoir entitled "The Deeds and Opportunities of a Great Technical College," by Dr. R. H. Thurston, director of Sibley College, Cornell University.

CORRESPONDENCE.

Chemistry in the Foundry.

To the Editor: I notice in the last issue of *The Iron Age* a letter from Wm. Molin on the apparently debatable question, Shall chemistry be used in the foundry? in which he refers, I presume, to my expressions on this subject at the June meeting of the Foundrymen's Association in Philadelphia.

Mr. Molin is quite right in saying that an analytical chemical knowledge of its mixtures is as important—or nearly so—to the foundry as to the steel mill, and that, for the foundry, of this knowledge that relating to the prevalence of silicon is perhaps the most important. He, however, refers rather broadly to silicon as the *sine qua non* for good castings, whereas, I presume, could we get its effects without its presence, as foundrymen we should be better pleased, for the more nearly we can approximate the pure iron—that is wrought iron—without the intermediate stages of white hard iron and steel, the better the quality of our castings will be for ordinary work. Cast iron, from the method of its manufacture and for the sake of its fluidity, must and does contain a great deal of carbon. The silicon does something, I suppose the chemists know what, to dictate how much of this carbon (which is probably in solution in the molten metal) shall reappear as graphite and how much shall remain, caught in the solidified metal as combined carbon. As we must have the carbon, as we need it, in fact, we also need the silicon then—just enough to make the carbon do as we prefer it should.

The above is our best guide as to what we shall put in our cupolas.

But mistakes will happen. The eggs do sometimes get mixed and the hen hatches ducks. The coke man may send you 48-hour coke with 30 per cent. more sulphur in it than you ought to have. As Mr. Molin says, something may even go wrong with your silicon—you find you have not quite as much in your cupola remelt as you thought you had in the pig. Something may go wrong with the profit on the casting when you learn, perhaps, after you have a week's work on hand, that they have turned out too hard for use or so weak and brittle from cooling strains that they split when pins are pressed in crank links, &c.

Now, in Philadelphia the other night, I likened physical tests in the foundry to gauge cocks on a boiler. There is nothing like knowing that there is water in a boiler, especially if it has a crown sheet. Their is nothing like knowing every day what the tendency of your mixture is—in time to keep it what it should be. For this you must have physical tests that are accurate and absolutely comparable from day to day.

Now, as to the practicability of a man, not a chemist by hard training and diploma—a man ("an intelligent boy" is Mr. Molin's prescription) and a \$200 outfit for separating and quantitatively weighing silicon and carbon. I do not know anything about prices, but have too much respect for the scales alone to make them responsible for what the I. B. and the balance of the \$300 equipment would make them swear to.

No, your chemist, when you need one, cannot be too good and reliable. But you can buy iron from furnaces today which will furnish you perfectly

reliable analyses of each shipment of pig—they will put it right in with the car numbers on a postal card—some of them. Pay a good chemist to check these once in a while and to analyze what you can not get in this way from time to time, and above all, test the iron you get practically and physically—its strength is only one indication and not all important.

Eternal vigilance is the price of safety.

E. M. MUMFORD.

NETHERWOOD, N. J., July 7, 1893.

PERSONAL.

Edward Shields, who has been foreman over the electrical appliances at the Homestead Steel Works, Homestead, Pa., has been appointed chief electrician at the new Bessemer plant now being built by the National Tube Works Company, McKeesport, Pa.

C. M. Schwab, superintendent of the Homestead Steel Works, Homestead, Pa., will sail for Europe on Saturday, the 15th inst. During his absence he will make a tour of the leading iron and steel plants in Great Britain.

The Homestead Cases.—At Pittsburgh an agreement has been entered into between the counsel for the prosecution and defense in the Homestead cases to postpone the final disposition of them until the September term of court. As the cases against the Carnegie officials and the Pinkertons have already been disposed of, only the riot, conspiracy, treason and murder cases against the ex-strikers remain. These will not be *nolle prossed*, as were the indictments against the others. The riot and conspiracy cases will be called in September, and pleas of *nolo contendere* will be entered by those under indictment. A suspension of sentence will be asked by the defense, and as the commonwealth will not oppose it it will likely be granted. When this has been done District Attorney Clarence Burleigh will bring the murder and treason indictments to the attention of the court and will say that the commonwealth has investigated the charges thoroughly and is satisfied that no conviction can be had under them. He will ask the court to make an order directing the district attorney to take no action in the matter of prosecuting them until further order of the court. This will finally end the famous cases.

Washington dispatches state that all the parties engaged on the Intercontinental Railroad survey have returned to Washington and are now engaged working up the data they have secured for the publication of their final report and the maps of the line. The line surveyed is about 4000 miles long. It connects the railway system of North America with that of South America. It is said that a feasible route has been found for the entire distance, with no grade greater than 4 per cent., but no particulars are given. It is further said that the engineer who is in charge of the survey through Columbia reports that for many miles the line runs through a mining region so rich that the material dug out of the cuts of the road would contain enough gold and silver to pay for the construction of the road over that section.

The Pottstown Iron Company of Pottstown have sold 4800 tons of basic slag to Germany.

A Heavy Decline in Pig Production.

The long-continued pressure upon the producers of pig iron has at last told upon the current production, a very sharp reduction in the active capacity having taken place. With the exception of the Pittsburgh district, it has told on all sections. Nor does this movement seem to have exhausted itself, reports from different parts of the country showing that additional plants are preparing for, at least, temporary idleness. As it is, the output has been restricted during June at the rate of nearly 1,000,000 tons per annum. Of course, the consumption, notably on the part of steel works, is sharply restricted during the current month. Still, even with that fact fully taken into consideration, it must be obvious that, statistically, pig iron is getting into very much better shape.

On July 1 the active furnace plant, grouped according to fuel used, possessed the following weekly capacity:

Fuel.		
Anthracite.....	63	29,268
Coke.....	123	118,572
Charcoal.....	35	7,422
Total.....	221	155,262
Total June 1.....	244	174,029
Changes.....	-23	-18,767

The weekly product of all the furnaces on May 1 compared as follows with that of preceding periods:

	Furnaces in blast.	Capacity per week. Gross tons.
July 1, 1893.....	221	155,262
June 1.....	244	174,029
May 1.....	251	181,551
April 1.....	255	178,858
March 1.....	255	176,978
February 1.....	251	171,201
January 1.....	246	173,068
December 1, 1892.....	246	176,271
November 1.....	244	171,082
October 1.....	236	158,027
September 1.....	236	151,648
August 1.....	238	155,136
July 1.....	254	169,151
June 1.....	269	173,674
May 1.....	268	177,886
April 1.....	280	185,462
March 1.....	305	193,902
February 1.....	308	187,383
January 1.....	305	188,082
December 1, 1891.....	298	188,135

The position of the anthracite furnaces was as follows on the 1st of this month:

Anthracite Furnaces, July 1.

Location of furnaces.	Total number of stacks.	Number in blast.	Capacity per week.	Number out of blast.	Capacity per week.
New York.....	18	2	981	16	5,553
New Jersey.....	11	1	924	9	3,841
Spiegel.....	3	2	162	1	118
Pennsylvania:					
Lehigh Valley.....	44	21	8,383	23	8,999
Spiegel.....	1	1	63	0	0
Schuylkill Valley.....	27	14	7,737	13	4,673
U. S. Susquehanna Valley.....	14	8	3,243	6	1,430
L. Susquehanna Valley.....	17	8	4,698	9	2,215
Lebanon Valley.....	15	5	3,108	10	4,271
Totals.....	150	63	29,268	87	30,200

For a number of months past our records of active anthracite furnaces show the following:

	Furnaces in blast.	Capacity per week.
July 1, 1893.....	63	29,268
June 1.....	70	33,316
May 1.....	67	33,168
April 1.....	72	34,641
March 1.....	74	34,773
February 1.....	74	32,871
January 1.....	70	32,772
December 1, 1892.....	69	33,602

November 1.....	69	30,889
October 1.....	69	29,958
September 1.....	66	27,453
August 1.....	66	28,821
July 1.....	72	31,754
June 1.....	76	33,209
May 1.....	81	35,473
April 1.....	84	36,487
March 1.....	89	38,678
February 1.....	92	38,124
January 1.....	94	38,307
December 1, 1891.....	85	34,905

The reduction in the current output has been very heavy. There were blown out during June Montgomery and Pioneer in the Schuylkill Valley, one Bethlehem and Crumwold in the Lehigh Valley, the two Bird, Coleman and one Lebanon in the Lebanon Valley. Marshall has gone out since the end of June, and it is reported that the Lackawanna will also lessen its production. During June one of the Brooke furnaces in the Schuylkill Valley and Bloom in the Upper Susquehanna Valley resumed operations.

The status of the coke furnaces was as follows on July 1:

Coke Furnaces, July 1.

Location of furnaces.	Total number of stacks.	Number in blast.	Capacity per week.	Number out of blast.	Capacity per week.
New York.....	7	4	4,523	3	1,400
Pennsylvania:					
Pittsburgh district.....	24	21	34,022	3	3,126
Spiegel.....	2	2	2,000	0	0
Shenango Val.....	16	9	9,268	7	5,287
Juniata and Conemaugh Valley.....	16	7	4,880	9	3,511
Spiegel.....	1	1	661	0	0
Youghiogheny Valley.....	3	0	0	3	2,215
Miscellaneous.....	4	3	1,790	1	600
Maryland.....	5	3	3,736	2	1,850
West Virginia.....	1	0	0	1	250
Wheeling District.....	8	4	5,447	4	3,157
Ohio:					
Mahoning Val.....	15	7	7,987	8	6,537
Central and Northern.....	11	8	6,592	3	2,264
Hocking Val.....	14	2	808	12	2,880
Hanging Rock.....	14	7	1,559	7	1,535
Indiana.....	2	1	212	1	200
Illinois.....	19	6	10,341	13	16,975
Minnesota.....	1	0	0	1	629
Wisconsin.....	5	1	1,144	4	2,866
Missouri.....	6	1	677	5	2,850
Colorado.....	3	2	1,400	1	600
The South:					
Virginia.....	22	8	4,985	14	7,115
Kentucky.....	7	2	676	5	2,568
Alabama.....	38	16	11,385	22	12,287
Tennessee.....	14	6	3,694	8	4,165
Georgia.....	2	1	716	1	600
N. Carolina.....	1	1	97	0	0
Totals.....	261	123	118,572	138	85,407

As compared with previous months, the active coke furnaces make the following showing:

	Furnaces in blast.	Capacity per week.
July 1, 1893.....	123	118,572
June 1.....	140	132,079
May 1.....	146	139,788
April 1.....	145	135,488
March 1.....	145	133,579
February 1.....	140	129,398
January 1.....	138	131,731
December 1, 1892.....	136	133,160
November 1.....	133	130,673
October 1.....	128	118,895
September 1.....	128	114,538
August 1.....	131	117,984
July 1.....	140	127,433
June 1.....	145	128,852
May 1.....	147	132,313
April 1.....	152	138,116
March 1.....	163	143,490
February 1.....	167	138,268
January 1.....	163	138,611
December 1, 1891.....	162	142,747

The record of the month is one of nearly general restriction of product. The list of furnaces which have gone out of blast is a long one and includes very important producers. Among the furnaces stopped during June we may note Carrie in Allegheny County, Benwood and Wheeling in the Wheeling

district, Fulton in the Hanging Rock, Blanche having banked on the 3d inst., Akron in the Hocking Valley. Chicago in Illinois, Hannah banked and Thomas in the Mahoning Valley, Mayville in Wisconsin, one Crozer in Virginia, Norton in Kentucky, one De Bardeleben, Philadelphia, and two Woodward in Alabama, and Embreeville in Tennessee. Against this three were blown in during June, No. 2 Schoenberger in Pittsburgh and Princess and Pulaski in Virginia.

The status of the charcoal furnaces was as follows:

Charcoal Furnaces, July 1.

Location of furnaces.	Total number of stacks.	Number in blast.	Capacity per week.	Number out of blast.	Capacity per week.
New England.....	13	5	400	8	560
New York.....	5	1	80	4	485
Pennsylvania.....	13	1	45	12	870
Maryland.....	7	1	83	6	594
Virginia.....	13	0	0	13	827
Ohio.....	9	5	384	4	189
Kentucky.....	3	1	81	2	200
Tennessee.....	8	5	1,138	3	330
Georgia.....	3	1	275	2	320
Alabama.....	13	6	1,944	7	1,510
Michigan.....	20	4	1,278	16	4,889
Missouri.....	2	1	326	1	293
Wisconsin.....	4	3	1,243	1	200
Texas.....	4	1	143	3	560
Washington.....	1	0	0	1	100
Oregon.....	1	0	0	1	225
Totals.....	119	35	7,422	84	13,152

As compared with previous months, the record of active charcoal furnaces stands as follows:

	Furnaces in blast.	Capacity per week.
July 1, 1893.....	35	7,422
June 1.....	34	8,034
May 1.....	38	8,695
April 1.....	38	8,739
March 1.....	36	8,693
February 1.....	37	8,934
January 1.....	38	8,865
December 1, 1892.....	41	9,500
November 1.....	42	9,540
October 1.....	39	9,174
September 1.....	42	9,657
August 1.....	41	8,331
July 1.....	42	9,964
June 1.....	48	11,613
May 1.....	40	10,100
April 1.....	44	10,859
March 1.....	50	11,734
February 1.....	49	10,981
January 1.....	48	11,164
December 1, 1891.....	52	11,033

In spite of the fact that the number of furnaces in blast has remained practically stationary, the capacity has fallen off, because it has been among the large producers that stoppages have occurred. There were blown in during June, Landon, in Connecticut; Bellefonte, in Kentucky; Olive and Jefferson, in the Hanging Rock, Center having run only 18 days after two years' idleness. The stoppages include Oswego, in Oregon; Newberry and Union, in Michigan, leaving only four furnaces blowing in that State; and Aetna, in Tennessee. Boiling Springs, in Pennsylvania, and Catocin, in Maryland, are to start this month, the latter on cold-blast iron.

Stocks.

The position of stocks, sold and unsold, as reported to us July 1, was as follows, the same furnaces being represented as in former months:

	Stocks: Ap'l 1.	May 1.	June 1.	July 1.
	Tons.	Tons.	Tons.	Tons.
Anthracite pig.....	138,328	133,209	117,595	114,955
Coke pig.....	337,080	324,894	321,987	324,138
Charcoal pig.....	195,868	202,272	202,608	193,629
Totals.....	671,274	660,345	642,190	632,722

It will be seen that the only change during the month has been a reduction of about 9000 tons in charcoal stocks.

The Western Iron Scale.

Contrary to general expectations no settlement of the iron scale was reached at the meeting of the Conference Committees of the manufacturers and the Amalgamated Association, held in the Ferguson Building, Pittsburgh, on Saturday, the 8th inst. The meeting convened about 2 p.m., and was in session only two hours, and, upon request of the manufacturers, was adjourned until Monday, July 17, at 2 p.m., at the same place. About the same arguments ensued as were presented at previous meetings, the manufacturers stating that, while the proposition of the men to accept \$5 per ton for boiling was satisfactory as far as it went, it would have to be followed by reductions in the finishing departments ranging from 5 per cent. to 15 per cent., and in some cases as much as 20 per cent. This last proposition of the manufacturers to make a cut in finishers' wages is where the real trouble lies, and it is the cause of the failure to arrive at a settlement of the scale. The workmen state that they suffered a reduction of 10 per cent. last year, and while they are willing to make certain concessions of a minor nature, they do not feel that they should accept the heavy reductions proposed by the manufacturers. While considerable disappointment is manifested over the failure to formulate a scale after so many conferences being held, it is thought that a settlement will be finally reached and that no serious trouble will occur. The fact that many mills are undergoing extensive repairs that would not permit of operations being resumed at the present time, even with the scale agreed upon, has probably had much to do with the failure to arrive at an agreement thus far. This is particularly true of the mills in the Mahoning Valley, which are all closed at this time, some of them undergoing extensive repairs that will require a month or more to complete. A conference between the Mahoning Valley mill owners and the Amalgamated Association was held in Youngstown last week, but nothing was accomplished, the manufacturers in that locality evidently awaiting a settlement at Pittsburgh before taking definite action. Since our issue of last week the following named concerns have signed the iron scale, and will be governed by any changes made when the scale has been finally adopted:

Cherry Valley Iron Works, Leetonia, Ohio.

Illinois Steel Company, Chicago, for Milwaukee Works at Bay View.

Cleveland Hardware Company, Cleveland, Ohio.

Anniston Rolling Mills Company, Anniston, Ala.

Locust Point Iron and Steel Works, Locust Point, Md.

Kansas City Bolt and Nut Company, Kansas City, Mo.

During the past week several conferences have been held between Jones & Laughlins, Limited, of Pittsburgh, and a committee representing their workmen relative to a steel scale for 1893-94, but no agreement has been reached up to this time. As a result of several previous conferences with the firm, the workmen have prepared a new scale that contains reductions over the old scale, and this is now being considered by the firm. The high esteem in which this firm are held by their workmen on account of the fair treatment they have always accorded to their employees, leads to the belief that the men will

accept such reductions in wages as will put them on an equitable basis with concerns employing non-union men. Another meeting between the firm and their workmen will be held this week.

(By Telegraph.)

At a conference held in Pittsburgh yesterday between Jones & Laughlins, Limited, and their workmen, a settlement was reached, and the firm have signed both the steel and iron scales. While the concessions granted the firm on the Steel scale were not as large as desired, the basis of settlement, as a whole, is satisfactory to the firm and their employees. The plant is now closed, undergoing repairs, but is expected to resume operations in all departments on Monday morning, July 17, when the firm will be in a position to fill all orders, as heretofore. The firm signed the iron scale with the understanding that they will be allowed the benefit of any changes made when the scale has been adopted. The Arctusa Iron Works, Newcastle, Pa., and Findlay Rolling Mill Company, Findlay, Ohio, have also signed the Iron scale on same conditions. The action of Jones & Laughlins, Limited, in signing the scales and resuming operations is expected to bring about a final settlement with other manufacturers at the next conference, to be held in Pittsburgh on Monday, July 17.

The Minnesota Iron Company.

In announcing to the stockholders that the dividend on the Minnesota Iron Company would be passed, H. H. Porter has issued the following statement, which is of interest as showing the status of this probably the greatest of our iron-mining companies:

The capital stock of the Minnesota Iron Company is \$16,500,000. The property of the Minnesota Iron Company now consists of the iron mines in Township 62-15, St. Louis County, Minn., thoroughly equipped for business with the most modern machinery, and Mining now at the rate of 600,000 tons per year, and with more iron ore in sight, located by the diamond drill, than ever before—not less than 4,000,000 tons; about 11,000 acres of land selected with reference to mining interests; about 2700 acres of land at Two Harbors, on Lake Superior, the shipping port for the Duluth & Iron Range Railroad; the Duluth & Iron Range Railroad, 135 miles in length, thoroughly equipped in every respect, its ore docks, machine shops, and yards at Two Harbors alone costing more than \$1,200,000, and with a State land grant of about 500,000 acres, of which 184,000 acres have already been patented to them; the Chicago & Minnesota Ore Company, owning a majority of the stock of the Chandler Mine, mining this year about 700,000 tons of ore; and also owning the Canton Mine, mining this year about 100,000 tons; also various other organized companies owning in the aggregate about 24,000 acres of timber and mineral lands.

The company also own eight large steel steamers, four built in 1890, two in 1891 and two in 1892, their aggregate carrying capacity, between docks at Two Harbors and Lake Erie ports,

being about 500,000 tons per annum. The steamers cost over \$1,600,000. Much of the property above mentioned, including the steamships, is represented by the stocks and bonds of proprietary companies, all of which are in the treasury of this company. The Duluth & Iron Range Railroad is subject to a mortgage of \$5,209,000, interest 5 per cent. per annum, payable semi-annually. The net earnings of the entire property, owned by the Minnesota Iron Company, for the past five years, after paying interest on railroad bonds, have been as follows:

Year ending April 30, 1889....	\$632,900.45
Year ending April 30, 1890....	932,578.05
Year ending April 30, 1891....	1,570,446.36
Year ending April 30, 1892....	1,157,846.48
Year ending April 30, 1893....	1,351,721.62
Total.....	\$5,645,492.96

The Minnesota Iron Company have paid the following dividends:

Year ending April 30, 1891.....	\$840,000
Year ending April 30, 1892.....	915,000
Year ending April 30, 1893.....	990,000
	2,745,000.00

Leaving a balance of surplus earnings of.....\$2,900,492.96

Out of this surplus the entire payment for the steamers before mentioned has been made, as well as large expenditures in improvement and enlargement of docks, track, machine shops, and yards of the railroad company, and machinery and other improvements at the mines, all believed to have been wise expenditures in the interest of the company.

On May 1, 1893, the Minnesota Iron Company had on hand:

Ore in stock at mines, 334,770 tons at cost.....	\$463,678.00
Ore in transit, 2101 tons at cost	4,843.59
Ore at Lake Erie ports, 235,050 tons, valued at..	\$1,014,753.81
Less ore due to customers, paid for but not taken....	513,485.75
	501,268.06
Cash, bills and accounts receivable, all believed to be good,	678,412.80
Supplies at mines.....	95,977.45
Good railway first mortgage bonds.....	\$640,000.00
Mining stock, valued at.....	40,210.00
	680,210.00
Total.....	\$2,429,389.90
Its total indebtedness was....	379,094.37
Balance.....	\$2,050,295.53

Boston advices are to the effect that the annual report of the Lake Superior Iron Company for the year to April 30, shows: Gross earnings \$1,370,783, and expenses \$1,398,646; but reckoning coal on hand as cash the net figures \$172,030, after allowing \$155,688 for depreciation. The balance sheet shows: Assets \$854,426 in excess of liabilities. The report says that the iron ore market is the worst since 1881. The company earned a moderate dividend, but it was partly due to profits on steamers.

On the hoop-iron scale the Amalgamated Association has offered a reduction of 10 per cent. on all sizes up to and including No. 13, and 5 per cent. on No. 13 to No. 20. No. 21 is to remain at the list.

The Maryland Steel Company are building a police patrol boat for New York.

MANUFACTURING.

Iron and Steel.

The entire plant of the Union Rolling Mill Company at Newburgh, Ohio, which has lost but three days, and those legal holidays, in the past year, will be closed down during the entire month of July, regardless of scale decisions.

The three blast furnaces owned and operated by the Wheeling Steel & Iron Company at Wheeling, W. Va., are idle at present, undergoing repairs.

By consent of the judgment creditors of the Duquesne Tube Works Company, with offices in Pittsburgh and works at Duquesne, Pa., which made an assignment about the middle of June, the writ of sale of the property of the firm set for Monday, July 3, was postponed until a later date. In the meantime there will be a meeting of the unsecured creditors and a bill in equity may be prepared to have the writ permanently stayed. The amount of unsecured claims aggregates nearly \$300,000, while those of the creditors holding judgments amount to \$190,000. A report made last week by J. H. Thorn, assignee, shows assets of \$563,886.30 and liabilities of \$479,592.47. There is an effort being made by the unsecured creditors to get a better settlement with the judgment creditors, and a meeting for that purpose was held in Pittsburgh last week, but nothing was accomplished. If no arrangement is perfected, the bill in equity will be filed. We are advised that the report that the firm had been granted an extension is untrue. Most of the creditors have agreed to it, and it is expected that the others will. The report that notices had been posted at the works stating that operations would be resumed on Monday, the 17th inst., is untrue.

We are officially advised that the report that T. B. Everson would be relieved from the management of the Elba Iron Works, owned and operated by the Oil Well Supply Company, at Pittsburgh, is entirely without foundation. No change of this nature has been made or is contemplated by the firm. While the Elba Iron Works has so far been operated at a loss by the Oil Well Supply Company, this result is due to the depressed condition of the iron trade and particularly of the product turned out, and not to any inefficiency of the management. In connection with the above, John Eaton, receiver of the Oil Well Supply Company, has recently issued a circular letter to the trade which fully explains itself and which reads as follows: "Reports have been circulated that the business and factories of this company have been closed, pending adjustment, and it is for the purpose of correcting such reports that I beg to announce that the business is being continued by me as receiver. The factories are in operation, and as receiver I do not wish to lose any of the business of the company. Prices will be furnished upon application. Yours respectfully, John Eaton, receiver."

The Bessemer department of the American Iron & Steel Works of Jones & Laughlins, Limited, at Pittsburgh, is closed down, pending negotiations of the steel scale.

The Pennsylvania Steel Refining Company is the title of a new concern who have just secured possession of the works of the Greensburg Steel Company, at Greensburg, Pa., and expect to put the plant in operation some time during this month. The new concern will make high-grade tool steel exclusively, and, with exceptional facilities for its manufacture, they confidently expect to turn out high-grade product.

At Pittsburgh last week application was made in the United States Court for the appointment of receivers for the Eaton, Cole & Burnham Company of Connecticut. The concern manufacture oil-well supplies, and are an identified interest of the Oil Well Supply Company of Pittsburgh, which concern recently went into the hands of a receiver. Receivers were appointed in Connecticut, but an appointment at Pittsburgh was also asked, to give the receivers jurisdiction in the Circuit Court. Edward G. Burnham and Edward H. Cole were appointed receivers.

The Brilliant Steel & Iron Company, Brilliant, Ohio, manufacturers of iron and steel bars, angles, tees and special shapes, advise us that the statement that the interests of their firm would be consolidated with those of the Junction Iron Com-

pany, at Mingo Junction, Ohio, is entirely without foundation. At the present time there are no negotiations on foot looking to the consummation of such a consolidation.

The sale of the property of the Brady's Bend Iron Company, at Brady's Bend, Pa., which was to have taken place at Kittanning, Pa., last week, has been adjourned until August 1.

No. 1 Furnace of the Carrie Furnace Company of Pittsburgh has been blown out for relining and repairs. The stack has been in blast for nearly two years on one lining, and during that time has turned out an average production of 250 tons of iron every 24 hours. As soon as repairs have been completed the furnace will again resume blast.

The Low Moor Iron Company, Low Moor, Va., have purchased from Frank Lyman of Brooklyn, N. Y., his interest in the furnace at Covington, Va., also the Stack and Dolly Ann mines, and the Iron Mountain mine, for \$400,000. One-third of the stock of the consolidated interests is taken in payment, and as Mr. Lyman and his family already controlled the Low Moor stock, this deal will give him a large majority of it. It is stated that Mr. Means, the present president of the company, will retire next February, and will be succeeded by Mr. Lyman.

The Fort Worth Bridge & Iron Company, with a capital of \$100,000, have been incorporated at Fort Worth, Texas, by R. N. Hatcher, C. H. Sellemann and T. A. Tidball.

It is stated that the Radford Pipe Foundry, East Radford, Va., will start up the middle of July. The stock is being rapidly secured, and 300 or 400 men will be employed. The works are among the largest in the South. They have been closed down since last January.

The Bellaire Nail Works, Bellaire, Ohio, have recently made some changes and additions to their plant, and as soon as the firm have arranged a wage scale with their men for the year ending on June 30, 1894, this firm will be in a position to roll sheet bars and skelp as well as nail plate. However, the firm can do nothing toward operating the new plant until their Bessemer plant can furnish a supply of steel, and from present appearances it will be some time before an understanding is arrived at with their men. Last year the works of this firm were idle nearly two months, and it may take even a longer time this year before a settlement satisfactory to the firm has been consummated.

The Salem Wire Nail Company, manufacturers of wire nails, with works at Salem, Ohio and Findlay, Ohio, advise us that both mills are closed down, and will remain idle until August 1 next. This is in accordance with an agreement entered into between leading wire nail manufacturers in the West to close their plants during the month of July.

The Cincinnati Tin Plate Company of Cincinnati, Ohio, have been granted a charter, with a capital stock of \$10,000, for the purpose of engaging in the manufacture and jobbing of metals of various kinds. Howard Douglass of Cincinnati is prominently identified with the new concern.

Operations have been indefinitely suspended at the Rock Hill Furnace of the Rock Hill Iron & Coal Company at Rock Hill, Pa. The refusal of union men to resume work on account of nine of their number being discharged for good and sufficient reasons is the cause of the suspension of operations.

The Tudor Iron Works of St. Louis, Mo., entered suit at Pittsburgh last week against the Madison Car Company, a corporation at Illinois, to recover \$15,000, with interest from June 24, 1893. The amount is claimed to be due on a four months' promissory note. A foreign attachment was issued against effects of the defendant in the possession of the Pennsylvania Company and \$30,000 bail required for their release.

No. 3 Furnace of the Glendon Iron Company at Glendon, Pa., has been blown out, and it is stated that all three furnaces may remain idle during the remainder of the year. The stack just blown out will be relined and all the furnaces put in readiness to resume as soon as an improvement in the iron trade warrants it.

The repairs on the Big Stone Gap, Virginia, Iron furnace have been completed and the furnace will resume operations at an early day. Gen. R. A. Ayers, receiver of the Appalachian Steel & Iron Company

of Big Stone Gap, states that he is determined that the business of the company shall not remain suspended.

The receivers of the Belleville Steel Company, Belleville, Ill., have issued a report, in which it is shown that in the 13 days from June 12 to June 25, the Waugh Steel Mill made a profit of \$3093.27.

It is announced that the Sterling Rolled Cold Steel Company will erect a \$75,000 plant at Wilson's Station, Pa., on the Pittsburgh, Virginia & Charleston Railroad. Seven acres of land have been acquired for the purpose, and the work of construction will begin at once.

Machinery.

The Riehle Bros. Testing Machine Company, Philadelphia, have just received an important order from the Civil Engineering Department of the Cornell University for a 400,000 pound vertical screw power testing machine with all the latest automatic and electric attachments, recording diagram apparatus and special tools for testing girders up to 18 feet in length, transversely; also for crushing columns 10 feet high, and for applying tensile strain to rods, bars, &c., 10 feet long, stretching them, if necessary, 25 per cent. of their length before breaking. This machine is without doubt the largest screw power testing machine in the country, if not in the world. The Riehle Company not long ago placed a horizontal hydraulic testing machine of the same capacity (400,000 pounds or 200 tons) in the Boston Navy Yard. This machine weighs by means of scale levers, and is the largest hydraulic machine with levers in the United States.

The Diamond Machine Company of Providence, R. I., are in position to fill orders for their regular goods promptly. The recent destruction of their property did not include their patterns. They have secured about three acres of most desirable property in Providence upon which new and modern factories will be erected, one of which will be in operation and running October 15, 1893.

Jenkins Brothers of 71 John street, New York, have made an improvement in the manufacture of a rubber compound for use on high pressure steam. For nearly two years they have been using and testing this rubber compound in the manufacture of Jenkins Disks, and the results have been more than satisfactory. They have passed the experimental stage and regard it as the greatest advancement made by them in the manufacture of their specialties.

Alfred Box & Co. of Philadelphia, are engaged on quite a number of traveling cranes, with capacities of 25 to 30 tons, and for traveling spans of 40 to 60 feet. Most of them are for use in electric light stations. The firm report business pretty brisk and have orders ahead which will keep their works running at their fullest capacity for some time.

The Gartland Foundry Company, Cleveland, Ohio, will begin work August 1. They start business with a large number of orders booked.

The Rensselaer Valve Works, Cohoes, N. Y., have just completed two large valves, weighing 10,000 pounds apiece, for a Rochester, N. Y., concern, and an order has been received from a firm in Buffalo for a 60-inch valve that will weigh 8 tons, and will be the largest ever made.

The machine, wood working and tin shops comprising the principal buildings of the North American Mill Building Company's works at Stratford, Ont., have been burned at a loss of \$30,000.

The new Fitzgibbons Boiler Works, at Oswego, N. Y., have been put in operation. The first work turned out of the shop will be a 90 horse-power high-pressure boiler. The new concern will give particular attention to furnishing boilers for electric light work and heating purposes. Already two firms manufacturing high-grade engines for electric light work have negotiated to use the Fitzgibbons boiler. The proprietor states that the outlook promises a prosperous season, with plenty of work. The old plant will be utilized by the boiler manufacturers for the present for repairs and light work connected with boiler manufacture.

The Bucyrus Steam Shovel and Dredge Works have ceased to operate at Bucyrus, Ohio, the balance of the machinery having been shipped to the new works at South Milwaukee, Wis.

Miscellaneous.

The final organization of the company who have purchased the J. S. Newmyer coal field of 2000 acres near Perryopolis, Pa., was completed at Dawson, Pa., last week and the application for a charter has been forwarded to Harrisburg. The land having originally been owned by George Washington, the company adopted as their name the Washington Coal and Coke Company.

The Berlin Iron Bridge Company of East Berlin, Conn., have received from E. D. Leavitt, consulting engineer of the Calumet & Hecla Mining Company, contract for the iron roof over their new engine house. The building will be 80 feet wide and 200 feet long.

The New York Shipbuilding & Engine Company will establish a ship yard at Whitestone, N. Y. President, E. A. Stevens (Hoboken Ferry Company); superintendent-engineer, C. D. Mosher; nav. architect, William Gardner.

The Pittsburgh stockholders of the Westinghouse Brake Company, Limited, of London, England, recently received copies of a circular notifying them of a proposed issue of \$250,000 worth of 5 per cent. bonds and which reads as follows: "You will be aware of the large increase which has taken place in the business of this company during the past three years, and of the handsome dividends which have been paid to the stockholders. The lease of the company's original works in London and Paris has recently terminated; and the company have acquired freehold land near Paris, and further freehold land at Hanover, in addition to their freehold property at York road, King's Cross, London. The lease for upward of 50 years of about an acre of ground adjacent to the company's freehold estate in York road had also been purchased. On part of the latter a foundry is in course of erection, and new and well equipped works have been built on the company's freehold in York road, as well as near Paris and at Hanover."

The Pittsburgh Reduction Company of Pittsburgh, manufacturers of pure aluminum, with works at Kensington, Pa., have just closed a contract with the Niagara Falls Power Company, whereby they will receive power to run a branch plant at that place for the reduction of aluminum. The firm will erect large buildings and expect to have the works in operation early next year.

The Western Brass Works, at Gas City, Ind., have been burned. The works had been in operation but a short time.

The Dallas Stamping Works, which started six months ago at Dallas, Texas, have made an assignment. The liabilities amount to \$21,652, while the assets are placed at \$30,000. Dullness of trade and tight money are said to be responsible for the failure.

The Schultz Belting Company, St. Louis, Mo., report an active demand for their belting from abroad. Among the recent orders received by them is one for 20,000 feet of single and double belting to be shipped to Moscow, Russia.

The strike at the Sturtevant Blower Works, Jamaica Plain, Mass., is still on, with no signs of weakening on either side.

The plant of the Empire Mfg. Company of Keokuk, Ia., has been destroyed by fire, entailing a loss of about \$60,000. The company carried an insurance of \$23,500, and were doing a fairly satisfactory business. It is doubtful if the plant will be rebuilt.

Application for a charter for an intended corporation to be known as the Carbon Coke Company of Pittsburgh has been filed. The incorporators are: W. Y. Humphreys, F. F. Vandervort, Hermon Griffin, J. H. Stewart and E. S. Humphreys, all of Pittsburgh.

The Terre Haute Car Mfg. Company at Terre Haute, Ind., have closed their works for an indefinite period.

The Case Mfg. Company of Columbus, Ohio, have increased their capital stock from \$150,000 to \$200,000.

The rumor that the Edison General Electric Company of Schenectady, N. Y., would move to a tract of land at Depew, the new manufacturing suburb of Buffalo, N. Y., is denied by the officers of the company.

The Farrow Arms Company have completed their new plant at Morgantown, W.

Va., and have all their machinery placed. The plant will manufacture firearms and commence operations at once.

The Rome, N. Y., Brass & Copper Company have elected the following trustees: Samuel O. Scudder, Wiley J. P. Kingsley, Bloomfield I. Beach, Harmon G. Utley, Allen M. Wardwell, Daniel G. Dorrance, William R. Huntington, Thomas H. Stryker, Jonathan S. Haselton.

The Duquesne Reduction Company of Pittsburgh have received a charter of incorporation with a capital stock of \$25,000. The new concern propose to engage in the manufacture of brass, lead, &c., and to make specialties from the same. The directors are Chas F. Hood, Sydney S. Klinerdingler and Samuel F. Hood.

The new machine shop of the Coe Brass Mfg. Company will be 40 feet wide and 300 feet long, two stories high. The building is designed and built by the Berlin Iron Bridge Company of East Berlin, Conn., and will be covered with their Patent Anti-Condensation Corrugated Iron Roofing.

The strike of wire drawers at the American Wire Works, Cleveland, Ohio, has ended. Concessions on both sides were made before amicable terms could be arrived at. The men objected to the quality of wire furnished and the discharge of four of their number.

The employees of the Eaton, Cole & Burnham Company at Bridgeport, Conn., have been paid, and operations at the works resumed in full. The works closed down some time since when the company were overtaken by financial troubles.

Trade Publications.

IF ANY DOUBTS EXISTED as to the great progress made by artistic iron workers in this country, a glance at the contents of the newly issued catalogue of the Winslow Bros. Company of Chicago would abundantly suffice to dispel such misgivings and afford conclusive evidence of the high position this branch of industrial art has reached in the United States. The catalogue in question is actually a handsome album containing numerous beautiful photographic reproductions of ornamental metal work, chiefly in wrought iron, which have been executed by the firm for many prominent office and public buildings throughout the country. As a record of the progress made by them in the application of metal to architectural and decorative purposes, this volume is a sufficiently striking one. It also reflects great credit on the architectural iron working industry of America generally, showing clearly, as it does, the marked strides made within the last few years toward the attainment of higher artistic ideals in this craft. Messrs. Winslow, who are their own publishers, issue two editions of their 1893 catalogue—a photogravure edition, containing 141 plates, and a lithographic edition of 83 plates, 11 x 14 inches in size, showing over 400 designs in hand-wrought metal work.

The specimens given in the photogravure edition before us evidence the growing appreciation of this class of work by architects and others in the decoration of our modern buildings. The cities of Chicago and Minneapolis furnish the majority of the subjects presented, but the list of buildings in which Messrs. Winslow's work has been placed covers a wide field, including Germany and Mexico, besides all parts of the United States. The 141 plates contained in the collection reproduce very clearly the details of each piece of work, representing a large variety of objects, both architectural and purely ornamental. These include stairways and balconies, 23 plates; railings, 17 plates; elevator screens and cabs, 31 plates, and 70 plates devoted to grilles, lamps, counter railings, entrances, canopies, frames, brackets, screens, fire dogs, doors, knockers, kettle stands, skylights, &c. Among the more notable illustrations are those showing architectural wrought-iron work supplied to the Chamber of Commerce Building, the Armour Institute, Monadnock and Auditorium buildings, Northern Hotel and the Woman's Temple, in Chicago; the Mills Building in San Francisco, Cal.; Society for Savings Building, Cleveland, Ohio; Equitable Building, Denver, Col., and to the Boston Block, Lumber Exchange and Public Library, in Minneapolis. Most of this work is of wrought iron, treated either by the Bower-Barff process or electro-bronze plated. Some stairways and elevator screens are

shown, however, as placed in the Monadnock and Venetian buildings, at Chicago, which are wrought of solid aluminum, and a number of bronze decorative panels and medallions in galvano-plastic. A handsome elevator car, in wrought iron, hammered-leaf work, Bower-Barffed, made for the Administration Building of the World's Fair, is a prominent object. Some of the smaller objects, such as lamps, kettle stands and brackets, show most delicate and beautiful work in flowers and leaves, which we have never seen surpassed.

Messrs. Winslow announce that they are about to bring out a monthly under the title of *Ornamental Iron*, which will be devoted to art metal work, and will contain numerous photogravure and half-tone illustrations.

SAGINAW, MICHIGAN.—Saginaw, Mich., is a good example of the young and progressive Western city of to-day. Sixty years ago the French philosopher, De Tocqueville, during his famous visit to the United States, desiring to gain some idea of the remote country situated at the utmost frontiers of civilization, selected the valley of the Saginaw, and made a brief stay at the little settlement of that name, which he found some difficulty in reaching. He spoke of it as a little post of less than 40 inhabitants, severed by more than a hundred miles from the nearest great European settlement, but predicted its future rise and importance in words which prove his remarkable foresight. To-day that little settlement is represented by a flourishing city of 62,000 population, teeming with life and industry. The cause of Saginaw's rise and prosperity is found in her advantageous situation in the center of one of the richest pine-timber regions of the United States; with an inexhaustible supply of salt deposits in the earth beneath. These resources have been splendidly developed, with the result of forming two large and healthily growing industries in these staples. The city of Saginaw is also becoming an important industrial center, with mills and factories embracing a large number of different manufactures. In the "Annual Review of the Saginaw Board of Trade for the Year 1892," just issued, detailed information of an interesting character is given in regard to these industries. It appears from this report that the product of the Saginaw saw mills and shingle factories last year exceeded 320,000,000 feet of lumber and 120,000,000 shingles, besides lath and stave pieces and headings for casks. One million barrels of salt represent the yearly output of that mineral. During 1892 the larger factories of the city put out an aggregated product of the value of \$15,167,445; and employed nearly 9000 workers, practically all men. Nearly \$4,000,000 was paid in wages, showing an average of \$11,500 per day paid to labor by these industries. A recent discovery of coal about 40 miles distant from the city promises to still further increase her facilities, and to give an impetus to all manufactures now located there, while tending to induce others to start up. Saginaw is surrounded by a rich farming country, which provides good and cheap living for the laboring man. The railroad facilities are excellent, lines radiating in 11 different directions from the city. Altogether the authors of the review above referred to appear fully justified in announcing the outlook for the future business prosperity of Saginaw as very bright.

WE HAVE RECEIVED from the American Well Works of Aurora, Ill., a very complete catalogue illustrating and describing the well boring machinery made by them. This includes everything needed for the work of boring and drilling wells from the smallest item to complete machines of the largest capacity.

THE CHARTER GAS ENGINE COMPANY of Sterling, Ill., publish a 40-page pamphlet which they entitle "Grain Edition of Late Letters Regarding the Charter Gas and Gasoline Engine." Testimonials are printed from persons in 18 States, using the Charter engine for automatic shovels, grain cleaners, feed mills, conveyors, roller mills, corn shellers, elevators, fanning mills, pumps, saws, hay and fodder cutters, &c. The constant theme of these letters is the very satisfactory performance of the engine in the use of gasoline direct from a tank. This has made it extremely popular in isolated locations, where manufactured gas cannot be obtained except at high cost for an independent plant.

TRADE REPORT

The financial difficulties still dominate the situation and nine out of ten large concerns are expending more energy and thought over their collections than they are over new business. The need of money is bringing into the markets a good many bargains and an unusually heavy proportion of the total purchases are covered in that way.

As will be observed from our usual monthly report, printed elsewhere, the production of Pig Iron has undergone a tremendous decline, the falling off being at the rate of nearly 1,000,000 tons per annum. Since the 1st of the month, when the returns were made, an additional number of furnaces have stopped and others are preparing to do so. It would not be surprising to find that the active capacity had declined to 150,000 tons per week on August 1.

There has been a hitch in the scale negotiations, and a further conference is to be held on Monday. Manufacturers and workmen cannot agree on the finishers' scale, the former asking a reduction commensurate with the decline in prices. The impression prevails that there will be no protracted struggle.

The signing of the Steel scale by Jones & Laughlins is important, because it foreshadows an early adjustment among the producers of Soft Steel Billets.

The contest over Coke contracts for the second half of the year has been brought to a conclusion practically by a victory for the buyers. The large producers have sold down to \$1.30, while the smaller concerns in the Connellsville region have offered as low as \$1.25. The majority of the old contracts were made at prices ranging between \$1.50 and \$1.75. The sliding scale of wages is based on \$1.90, so that a demand for a lowering may come at an early date.

It remains to be seen to what extent manufacturers will throw away the advantages gained through the cheapening of Raw Material and the lowering of labor cost. If recent actions justify inferences as to the course which events will take, the conclusion seems warranted that the buyer will get practically all of it.

The fact that the mills which have kept running seem as desperately eager for work from good customers, in spite of the idleness of so many Western works, is a pretty good indication of the volume of consumption. It is undoubtedly very light when contrasted with the amount of business which we have grown accustomed to regard as normal.

Chicago.

(By Telegraph.)

Office of *The Iron Age*, 59 Dearborn street, CHICAGO, July 12, 1893.

Pig Iron.—A few more large concerns have placed season contracts for local Coke Iron, but the general condition of trade is very bad. Consumers are not only requesting shipments deferred, but are asking for extensions of time on what they have bought. Inquiries for Southern Coke are confined to small lots of 100 tons and less, but rather more of these have been received the past week than for some time previous. Country trade seems inclined to purchase, now that prices are so low. A point has been reached, however, which is testing the endurance of makers, and they are beginning to withdraw extremely low quotations. Bargains are, consequently, not so numerous as they have been. The failure of Forsythe, Hyde & Co. attracts attention to the Lake Superior Charcoal trade, as they were known to have several thousand tons in storage yards. The banks holding the certificates are endeavoring to realize, and as there is practically no market now, some very low prices are likely to be made on this stock. Our quotations give the ring of regular asking prices, Chicago delivery, but they are subjected to concession, as usual of late, for immediate delivery.

Lake Superior Charcoal.....	\$16.00 @	\$16.25
Local Coke Foundry, No. 1.....	13.50 @	14.00
Local Coke Foundry, No. 2.....	12.65 @	13.00
Local Coke Foundry, No. 3.....	12.75 @	13.00
Local Scotch.....	14.00 @	15.00
Ohio Strong Softeners.....	15.75 @	16.25
Southern Silvery, No. 1.....	@	14.00
Southern Silvery, No. 2.....	@	14.00
Southern Coke, No. 2.....	12.75 @	13.00
Southern Coke, No. 3.....	12.25 @	12.50
Southern, No. 1, Soft.....	12.65 @	13.00
Southern, No. 2, Soft.....	12.25 @	12.50
Southern Gray Forge.....	11.50 @	12.00
Tennessee Charcoal, No. 1.....	16.50 @	17.00
Alabama Car Wheel.....	16.50 @	16.85
Coke Bessemer.....	14.50 @	15.00
Hocking Valley, No. 1.....	16.75 @	17.00
Jackson County Silvery.....	16.75 @	17.00

Later and more reliable information regarding Forsythe, Hyde & Co. Charcoal Iron is that the great bulk of it is not held by banks, but by other parties, who have decided not to sacrifice it. They may hold it for several months longer, or until there is a natural demand for such Iron.

Bars.—Numerous small orders are reported from all classes of buyers, even the largest consumers are now buying only from hand-to-mouth. They state that they are being offered remarkably low prices by some mills for future delivery, but sellers vigorously deny that such prices as are now being reported have been actually made. Quotations for anything like reasonably early delivery are continued at 1.45¢ @ 1.50¢, Chicago delivery, for Common Iron. The local mills are closed at present, and, while they are anxious for new business, they manifest a little firmer feeling. The valley mills are asking 1.40¢ at mills, half extras, but state that business at present is extremely quiet with them. Season contracts pending last week are still hanging, but some will probably be closed within a few days. Soft Steel Bars are well maintained on ordinary lots at 1.65¢ @ 1.70¢, Chicago. Stocks in warehouses have stiffened in price to some extent, owing to the shut down of the mills. The stocks held by jobbers here are not so heavy as they were last year, purchases being affected by the financial situation. The jobbers are, therefore, disposed to insist on higher prices, which they will probably get if the mills con-

tinue to shut down for an appreciable length of time.

Structural Material.—Most building work coming up is for points outside of the city, but plans are now completed for the new Union Square Theater here and for a large warehouse to be built by the Gormally & Jeffrey Mfg. Company. The closing of nearly all the Structural mills has caused a stiffening in the price of small lots of Beams, which are now selling at 2¢ and upward. Prices for mill shipment, Chicago delivery, are still quoted at 1.80¢ @ 1.90¢ for Beams; 1.95¢ @ 2.05¢ for Tees, and 1.75¢ @ 1.80¢ for Angles and Universal Plates.

Plates.—Mill orders are confined to small lots and not very many orders of this kind are coming on the market. The demand from stock is extremely light. Not much new work is being done in the boiler shops and repairing is also slack.

Sheets.—Inquiries for good round lots of Black Sheets are being received by mill representatives from other manufacturers who are in need of stock to help them out on contracts. Prices are consequently stiffening and the best makes are quoted at 2.75¢ at mill, or 2.80¢ here for No. 27 Common. Jobbers are now quoting 3¢ for No. 27 Common from stock and 60¢ advance on Wood's Smooth Iron. Very little business is doing in Galvanized Iron and prices are weak. The general quotation is still 70 and 10 % discount on mill shipments of Juniata, but this is shaded according to circumstances. Small lots are selling from stock at 70 and 2½ % to 5 % off. Sheet Copper is unchanged at 30 and 5 % off for small lots.

Merchant Steel.—Jobbing houses are in receipt of a steady trade in a small way, which is keeping up better at the present dull season than was expected. Mill representatives report a continued demand from season buyers. Quite a number of manufacturers of specialties in agricultural implements are placing orders for 100 to 300 tons, and the makers of standard articles are also buying to cover a considerable part of their requirements for the coming year. Enough has been done in this way to make the past week fairly active in this branch of trade. Regular prices to general buyers for mill shipments, Chicago delivery, are as follows: Smooth-Finished Machinery, 1.90¢ @ 2¢; Open Hearth Spring and Smooth-Finished Tire, 2¢ @ 2.10¢; Iron-Finished Tire, 1.70¢; Ordinary Tool, 6¢ @ 7¢; Specials, 12¢ and upward.

Rails and Track Supplies.—The Rail trade shows no special change, the demand still running to small lots and prices remaining firm at \$30 @ \$32, according to quantity. Splice Bar orders are showing a little improvement, but prices remain unchanged at 1.60¢ @ 1.65¢; Track Bolts with Hexagon Nuts, are still quoted at 2.55¢ @ 2.60¢; Spikes, 1.85¢ @ 1.95¢.

Old Rails and Car Wheels.—The tendency of Old Iron Rails is still downward. Holders are offering their stock at prices considerably reduced on those of two weeks since. No transactions have occurred in this immediate vicinity, but, based on offers made elsewhere, it is not likely that more than \$16.50 could be realized here. Old Steel Rails are very quiet and are probably worth \$10 for short lengths to \$13 for long lengths. Old Car Wheels are neglected and quoted nominally at \$14 @ \$14.50.

Scrap.—There seems to be absolutely nothing doing in old material. Selling prices are as follows per net ton: No. 1 Forge, \$12; No. 1 Mill, \$9; Sheet Iron, \$5; Pipes and Flues, \$7.75; Axles, \$18; Horseshoes, \$12; Fish Plates, \$14.50; Spikes and Bolts, \$12.50; Cast Borings, \$5.25; Wrought Turnings, \$7.25; Axle Turnings, \$9; Heavy Cast, \$10; Stove Plate, \$8; Malleable Cast, \$8; Mixed Steel, \$9.50, gross ton; Leaf Steel, \$16.

Metals.—Lake Copper continues to be quoted at 11.25¢ for carload lots. Casting brands are now selling at 10.25¢, with concessions for spot cash. Spelter is quoted at 4.5¢ @ 7½¢, with a very light demand. Pig Lead was quoted at 3.75¢ early in the week, but dealers are looking forward to fluctuations in the price, on account of the cessation of operations in the Western silver mines.

St. Louis.

(By Telegraph.)

Office of *The Iron Age*,
Bank of Commerce Building,
St. Louis, July 12, 1893.

Pig Iron.—The market has been without any special feature during the past week, and sales have been confined to car lots almost entirely. Prices are fairly well maintained, however, and the extremely low prices which have prevailed during the past three months have nearly all been withdrawn. The consumption of Pig Iron is being curtailed, as manufacturers are not running full nor are they likely to do so until about September 1. Production shows a gradual falling off, occasioned by the blowing out of furnaces, and, as we hear of several more who contemplate doing the same, the outlook can be considered fairly satisfactory. The financial situation dwarfs everything else and practically controls the market. We quote as follows for cash, f.o.b. St. Louis:

Southern Coke, No. 1 Foundry.....	\$13.25 @ \$13.50
Southern Coke, No. 2 Foundry.....	12.00 @ 12.25
Southern Coke, No. 3 Foundry.....	11.60 @ 11.25
Southern Gray Forge.....	11.25 @ 11.50
Southern Car Wheel.....	18.25 @ 19.25
Lake Superior Car Wheel.....	17.00 @ 17.50
Ohio Softeners.....	16.00 @ 17.00
Missouri Charcoal, No. 1 Foundry.....	13.00 @ 13.50

Bar Iron.—The condition of the Bar Iron market is practically the same as last reported. Mills are, as generally speaking, only fairly well supplied with orders and are not looking for any additional trade at the prices prevailing to-day. Some mills are already closed down while others are making preparations to do so at an early date. Mills quote from 1.42½¢ to 1.45¢ f.o.b. cars East St. Louis.

Barb Wire.—Orders for Barb Wire are exceedingly difficult to secure and mills and jobbers alike complain of the extreme dullness prevailing. Mills are adhering to \$2 for Painted in carload lots to jobbers, with Galvanized at 40¢ per cwt. additional.

Wire Nails.—The offerings continue large, but trade fails to respond even to the low prices at present prevailing. The only favorable feature is the shutting down of mills throughout the West, which will bring about a curtailment of production, and in this way assist the market somewhat. The stocks already in hand, however, are large, and it will take some time to dispose of

them. Mills quote \$1.50 in carload lots to jobbers. Jobbers ask \$1.60 to the country trade.

Rails and Track Supplies.—Steel Rails are dull and neglected at \$31 @ \$31.50, according to quantity. Track Supplies are quoted as follows: Splice Bars, 1.70¢; Spikes, 2¢; Bolts, Square Nuts, 2.50¢; with Hexagon Nuts, 2.60¢. Old Rails are offered at \$16 without any sales.

Pig Lead.—The improvement noted last week continues, and 3.35¢ @ 3.40¢ is the asking price to-day. The situation is greatly improved and a higher range of values is anticipated.

Spelter.—In the absence of any transactions prices are purely nominal at from 3.90¢ to 4.10¢, the latter price being paid for the metal of the better grade.

Louisville.

LOUISVILLE, KY., July 10, 1893

There is no change in prices, consumers buying from hand to mouth, the tightness of money still being a prominent factor in preventing buying. There have been a few sales, the parties purchasing because they believed that owing to the number of furnaces out, which could hardly be started up without a strong advance, the prices would be stronger, and that it was wise to purchase at the present moment. This is not the general feeling, but we believe is the correct one, as already certain grades are difficult to obtain, and if it were not that bank facilities are so narrow a slight advance at least would take effect at once. The demand for cars has fallen off, and most companies are finishing up orders taken sometime in the past, and there seems very little work in sight, so that it is reported some of the Western companies will at least run on half time, if not shut down entirely. The prices of Car Wheel Irons remain unchanged.

We quote for cash, f.o.b. cars Louisville:

Southern Coke, No. 1 Foundry.....	\$12.75 @ \$13.25
Southern Coke, No. 2 Foundry.....	11.50 @ 12.00
Southern Coke, No. 3 Foundry.....	11.00 @ 11.25
Southern Coke, Gray Forge.....	10.50 @ 10.75
Southern Charcoal, No. 1 Foundry.....	15.00 @ 16.00
Southern Car Wheel.....	17.50 @ 17.75
Spathite.....	11.50 @ 12.50

Cincinnati.

(By Telegraph.)

Office of *The Iron Age*, Fifth and Main Sts.,
CINCINNATI, July 12, 1893.

There cannot be said to be any essential improvement in Pig Iron. On the contrary, some sales have been made for spot cash and prompt shipment at concessions of about 25¢ from quotations, which we do not change, for these cash sales are few and exceptional. The volume of business in the aggregate is not large and the demand is mainly for single car lots, although there have been several sales reaching 500 tons. Nearly all varieties of Iron have sold to some extent, but the chief demand is for No. 2 Foundry. There is, however, no demand for Charcoal Car Wheel Iron and not much for other kinds of Charcoal Iron. The sales have been especially moderate in this district, but the aggregate is helped out by sales to the East and to the Northwest. Collections have been better than might have been expected for the first of July settlements, considerable money being forthcoming, but on the other hand notes have been given by parties whose paper has never

been seen before. So that it is the unexpected that is happening in the Iron trade as well as everywhere else. Business has been so adjusted that, while it is far from satisfactory, it is progressing in the Iron trade with less friction, although the difficulties in money affairs are very depressive and burdensome. Requests to postpone deliveries on maturity contracts continue to be the rule. Quotations are as follows:

Foundry.

Southern Coke, No. 1.....	\$13.00 @ \$13.25
Southern Coke, No. 2.....	11.50 @ 11.75
Southern Coke, No. 3.....	11.00 @ 11.25
Ohio Soft Stone Coal, No. 1.....	16.00 @ 16.25
Ohio Soft Stone Coal, No. 2.....	15.00 @ 15.25
Lake Superior Coke No. 1.....	15.00 @ 15.25
Lake Superior Coke No. 2.....	14.00 @ 14.25
Hanging Rock Charcoal, No. 1.....	18.50 @ 19.00
Hanging Rock Charcoal, No. 2.....	17.50 @ 18.00
Tennessee and Alabama Charcoal, No. 1.....	15.00 @ 15.50
Tennessee and Alabama Charcoal, No. 2.....	14.00 @ 14.50

Forge.

Gray Forge.....	10.50 @ 10.75
Mottled Coke.....	10.50 @ 10.75

Car Wheel and Malleable Irons.

Standard Southern Car Wheel.....	16.75 @ 18.00
Lake Superior Car Wheel and Malleable.....	17.25 @ 17.50

Philadelphia.

Office of *The Iron Age*, 220 South Fourth St.,
PHILADELPHIA, Pa., July 11, 1893.

There is little or nothing to be said in regard to the condition of the Iron and Steel trade, except that it is extremely depressed, and for the present shows no indications of improvement. Mills are supposed to have resumed operations, but orders are so scarce that it is impossible to do more than run single turn; some are doing even less than that. Furnaces have been put in condition to wait the advent of better times, some banked, others blown out, so that it is hardly likely that Pig Metal will be lower than it was during the first half of the year; with a fair chance that some time during 1893 better prices will be seen than any yet realized. This opinion is based more on reduced supply than increased demand, although that is not beyond the bounds of possibility. As regards Finished Material, such as Billets, Plates, Bars, Shapes, &c., the prospect is less encouraging. The mills are nearly all assuming an aggressive attitude, and as there is nothing to indicate a better demand, it is difficult to see how they all can keep their doors open. Lower prices than those now ruling will not increase the volume of business, yet that feature appears to be more susceptible of development than any other. Perhaps this assumption is a little premature, but so far as can be seen that is likely to be the outcome, unless there is some decided change in the situation, of which there are no immediate prospects.

Pig Iron.—Transactions have been few and unimportant during the past two or three weeks, and at the moment there is nothing in sight likely to bring about any particular increase in the volume of business. The continuous curtailment of production, however, enables holders to keep the market pretty well in hand, so that prices are steady and liable to develop firmness as soon as there is anything like an ordinarily good demand. In other words, the market is in good condition to resist unfavorable influences, as well as to respond promptly to anything that promises improvement. The trade seems to understand this perfectly, and while buyers are not taking large lots, neither

are sellers trying to force the market, feeling, as already stated, that there is nothing worse to come and that improvement is merely a question of time. This might, and probably would be, a very short time, if the money market was more settled, but buyers seem inclined to keep their hands free so long as the stringency continues, which feature is, in a measure, confirmed by the policy of sellers, who are just as well satisfied to carry a little Iron at present prices rather than have a lot of un-negotiable paper. Taking everything into account, therefore, we see no reason to expect any immediate change for the better, although when the turn does come it is very likely to be in that direction. General quotations are about as follows for Philadelphia deliveries, and from 20¢ to 30¢ less for Southern Irons at points accessible by water;

American Scotch, No. 1X...	\$16.00	@	\$16.50
American Scotch, No. 2X...	15.00	@	15.50
Standard Penna. (Lake Ore), No. 1x	15.00	@	15.50
Standard Penna. (Lake Ore), No. 2x	14.00	@	14.50
Standard Virginia, No. 1x...	14.50	@	14.75
Standard Virginia, No. 2x...	13.75	@	14.25
Virginia and Southern, No. 1x, Soft	14.25	@	14.50
Virginia and Southern, No. 2x, Soft	13.50	@	13.75
Standard Penna. and Virginia Forge	13.00	@	13.25
Ordinary Forge	12.50	@	12.75

Bessemer and Low Phosphorus Pig.—There is some little business doing, but nothing in lots of any importance. Sales reported at \$16 @ \$16.25, delivered, for Standard Bessemer, and \$18 @ \$18.25 for Low Phosphorus.

Steel Rails.—Business has shrunk to small proportions and to relatively low prices for Light Rails, Standard Sections being still quoted at \$29, f.o.b. cars mill's. Girder Rails are quoted at from \$34 to \$36, which figures usually include all necessary Fittings and Track Supplies.

Steel Billets.—Market extremely depressed, with no disposition on the part of consumers to do business. Sellers quote \$23.50 @ \$23.75, delivered, for Western Steel, but the intimation is given that on a nice order bids at 25¢ less would be considered, with a fair chance that a still further concession would be made on the right kind of an order. The fact that work is likely to be resumed in the West on a large scale and at slightly lower cost is a depressing feature, and confirms consumers in their determination not to buy except to cover actual and immediate requirements.

Muck Bars.—Buyers are hard to find except for small lots at from \$23 to \$23.50, delivered. Holders are inclined to expect a better demand soon, but the anxiety to realize keeps prices weak and unsettled.

Bars.—A fairly good demand is reported for small lots, which, however, is eagerly met at the low figures recently ruling—say 1.60¢ for city deliveries, and 1.50¢ at interior points. The prospect is not encouraging for the immediate future, and it looks as though the mills were going to have a dull time time during the next few weeks, as there are no large orders offering at any price. Steel Bars have sold as low as 1.50¢, delivered, but for extra qualities quotations vary from 1.70¢ to 1.80¢.

Skelp.—Nothing doing, asking prices 1.50¢ @ 1.55¢, delivered, for Grooved and 1.60¢ @ 1.65¢ for Sheared.

Plates.—Small lots are in good demand, and some of the mills are com-

paratively busy on work of this kind. Others are doing very little, and as there are no large orders around the prospect is not encouraging for the next few weeks. The financial situation is very much against large transactions and until money becomes easier extensive operations are out of the question. Competition for business is very sharp, however, and anything that promises a few days' work at the mills is taken at lower figures than ever before. It is impossible to give exact quotations, but small lots delivered can be placed at figures named below, with special concessions when the order is of any magnitude:

	Iron.		Steel.
Tank Plates...	1.80 @ 1.85¢	1.70 @	1.75¢
Bridge Plates	1.75	@	1.80¢
Shell	2.00	@	2.15¢
Flange	2.70 @ 2.90¢	2.20 @	2.40¢
Fire Box	3.00 @ 4.00¢	2.50 @	2.70¢
Special qualities	3.25	@	3.75¢

Structural Material.—The position is practically the same as noted in the preceding paragraph. There is some old business being finished up, but even on that specifications come in very slowly. This work, with a few new small orders, is about all the mills have to depend on, so that the outlook is rather discouraging. General quotations about as follows: Beams, Channels or Tees, 1.90¢ @ 2.10¢, according to size of order; Angles, 1.80¢ @ 1.85¢; Universal Plates, 1.75¢ @ 1.80¢.

Sheets.—Mills have resumed work, and considering the general depression, there is a fair demand for Sheets. Prices are very unsettled, however, and plenty of stuff can be had for less than quoted rates, which, for best makes in small lots, are about as follows:

Best Refined, Nos. 14 to 20...	2.75¢ @	2.85¢
Best Refined, Nos. 21 to 24...	2.90¢ @	3.00¢
Best Refined, Nos. 25 to 26...	3.15¢ @	3.20¢
Best Refined, No. 27...	3.30¢ @	3.40¢
Best Refined, No. 28...	3.40¢ @	3.50¢
Common, ½¢ less than the above.		

Quotations given as follows are for the best Open-Hearth Steel, ordinary Bessemer being ½¢ @ ¾¢ lower than above named:

Best Soft Steel, Nos. 14 to 16...	2½¢ @	2½¢
Best Soft Steel, Nos. 18 to 20...	2½¢ @	3¢
Best Soft Steel, Nos. 21 to 24...	3½¢ @	3½¢
Best Soft Steel, Nos. 25 to 26...	3½¢ @	3½¢
Best Soft Steel, Nos. 27 to 28...	3½¢ @	3½¢
Best Bloom Sheets, ½¢ extra over the above prices.		
Best Bloom, Galvanized, dis...	.70 and 5¢	
	@ 70 and 10¢	

Old Material.—There is little or no demand, and as a natural consequence nothing can be given as a definite quotation. Some kinds of material are not salable at any price, others that happen to be wanted may command figures about as follows: Old Iron Rails, \$16 @ \$17, delivered; Old Street Rails, \$18 @ \$19; Old Steel Rails, \$14 @ \$14.50; No. 1 Railroad Scrap, \$13.50 @ \$14.50, delivered; \$7.50 @ \$8.50 for clean new No. 2 Light Scrap; \$11 @ \$12 for Machinery Scrap; \$11 @ \$11.50 for Wrought Turnings; \$7 for Cast Borings, and nominally \$20 for Old Fish Plates, and \$13 for Old Car Wheels.

Wrought-Iron Pipe.—There is no disposition to do business on the part of manufacturers, who feel that they had better keep their Pipe than sell at such prices as the market will now afford, which are frequently far and away below nominal discounts, which are supposed to be as follows:

Butt-Welded Black	57½¢
Butt-Welded Galvanized	50¢
Lap-Welded Black	67½¢
Lap-Welded Galvanized	57½¢
Boiler Tubes, 2½ inches	65¢
Boiler Tubes, 3 inches	67½¢

Boston.

Office of *The Iron Age*, 146 Franklin St.,
BOSTON, July 11, 1898.

The Pig-Iron market has remained quiet since the holiday, and there is complaint of a dull trade. There is a very fair call for Manufactured Iron and Steel, especially in the direction of Building Iron, and there is considerable pressure for the delivery of Iron contracted for. The question of labor does not seem to be entirely settled, after all, and since one or two big Pittsburgh concerns are only running in some departments, the deliveries of Iron are considerably delayed. Still, it is expected that these troubles will soon be adjusted, and that the manufacture of Iron and Steel will go on again in such volume as will supply every possible want.

Pig Iron.—Trade is quiet in Pig Iron, but there is a feeling of security in regard to values that has scarcely been noted previous to this time. Some of the Southern furnaces are going out of blast, and once out of blast it is likely to be many months before they go in again. It is a fact that production of Iron in the South is being considerably shortened, though it is not yet apparent that the reduction is sufficient to strengthen the prices of Iron. Furnace managers report to their agents here that they are making Iron without profits, the present prices being so low that they scarcely pay the cost of production. This being the case, these same agents are holding firmly to quotations. Southern Iron, ex dock, in Boston, is quoted at: No. 1, \$15 @ \$15.50; No. 2, \$14 @ \$14.50; No. 3, \$13 @ \$14. Virginia Iron continues to be a feature in this market and it is quoted at \$15.50 for No. 1, and at \$14.25 @ \$14.50 for No. 2.

Bar Iron.—Bar Iron is steady, and some of the principal handlers here, in the way of a store trade, note a good business in the month of June. The Wareham Rolling Mills are very busy, with orders ahead, and the Portland Rolling Mills are busy, these including the principal producers of Old Material Bars in New England. Quotations are steady at: New England Old Material Bars, 1.60¢ @ 1.65¢, from mill; from store, 1.65¢ @ 1.70¢; best Puddled Iron Bars 1.80¢ @ 1.90¢ from mill; from store, 1.95¢ @ 2½¢. Norway and Swedish Bars are understood to be a little scarce in the trade here, though there is considerable Iron afloat for this market, but at present the market is pretty firm at \$66 @ \$66.50 for Bars from store, and at \$70 @ \$72 for Shapes.

Building Iron.—Trade is fair in Building Iron from the fact that contractors are inclined to push deliveries, as mentioned above. The failure of Morton & Chesley, builders, last week has very little to do with the Iron trade from the fact that they were not builders using much Iron, having been engaged in building dwelling houses rather than buildings requiring Iron. There are still some large orders on the market. The contract for the Iron on the new Boston & Maine train sheds is likely to be awarded this week, and it will involve some 1500 to 2000 tons of Building Iron, principally Beams and Channels. The failure or suspension of the Riverside Bridge Company of Paterson, N. J., was mentioned yesterday, but that has little to do with the New England Iron trade, for the very good reason that the company have done very little New England work at any

time. The Boston Bridge Works Company have work enough for a couple of months at least already booked, and the most of their mills are running two crews—a day and a night crew. Building Iron, though the tendency is really easy, is not quoted any lower by agents and dealers here. Beams and Channels from mill, 1.90¢ @ 2¢; from store, 2.30¢ @ 2½¢; Tees, 2.20¢ @ 2.30¢ from mill; from store, 2.40¢ @ 2.65¢; Angles, 1.80¢ @ 2¢ from mill; from store, 2.25¢ @ 3.35¢.

Steel, Steel Plates and Steel Rails.—The Steel market continues quiet. The position of values is regarded as easy, and yet agents and dealers are not admitting that prices are quotably lower. Bessemer Steel, 2¢ @ 2.10¢; Tire and Sleigh Shoe, 1.90¢ @ 2¢; Sheet, 2½¢ @ 2½¢; American Cast, 6½¢ @ 7¢; English Cast, 13½¢ @ 15¢; American Steel Rails, \$29 at mill. The demand for Steel Rails is reported quiet, though many of the prominent mills have considerable orders on hand. Steel Plates continue quiet, with the market easy: Tank, 1.80¢ @ 1.90¢; Shell, 1.85¢ @ 1.95¢; R-fined, 2.05¢ @ 2.12½¢; Fire Box, 2½¢ @ 2½¢.

Nails—A fairly good trade is reported in Nails, though the season, with the money stringency, begins to have an effect. Still the quotations are retained at \$1.40 per keg for car lots and \$1.45 @ \$1.50 for small lots of both Iron and Steel Cut Nails. Steel Wire Nails are easy at \$1.60 @ \$1.70 to the trade.

Pipes and Tubes.—There is a steady trade in Iron Pipes of fair proportions, though a lack of orders is mentioned. The market on the part of manufacturers continues easy, and the dealers here mention lower prices in the way of increased discounts. Boiler Tubes are dull, but prices are reported steady at: 3-inch and over, 67½ % off from list; 2½-inch and under, 65 % off.

Scrap Iron.—There is nothing encouraging to be found in the market on Scrap Iron. Blacksmiths and the principal producers of Scrap are reported as very indifferent about saving it. No. 1 Wrought is scarcely quotable at above 50¢ per 100 lb, though some lots are mentioned as held at 52½¢. Choice selections and Old Horseshoes are quotable at 55¢ @ 60¢ the latter price for a very fancy lot. Light Iron is dull and easy at 33¢ @ 38¢, as to quality. Machine Scrap is very quiet at 25¢ @ 30¢ for Cast and at 30¢ @ 35¢ for Wrought.

Pittsburgh.

(By Mail.)

Office of *The Iron Age*, Hamilton Building,
Pittsburgh, July 11, 1892.

Conditions governing the Iron and Steel trades have shown no perceptible change during the week. The Iron scale is still unsettled, but it is the general belief that an agreement will be reached by the time repairs have been completed and the mills are ready for operation. From certain near-by sections we have information that money seems to be a little easier, while other information would indicate that the situation does not show any signs of improvement. Among the industrial establishments things are nearly at a standstill. A majority of the mills are idle in the Pittsburgh district, while in the Mahoning Valley every mill is closed down, with present indications pointing to protracted idleness. With only

a few exceptions the Wire Rod, Wire and Wire Nail mills are off and will remain so during July. What little buying is being done is altogether for small lots, buyers not seeming to have the cash to purchase large lots, and sellers unwilling to book contracts with three or four months time attached to them. The probability that there will be a lowering in the cost of production by reason of reductions in the wage scales, is, doubtless, having the effect of keeping buyers out of the market, in the expectation that when the scales have been arranged they will be able to place their orders at lower figures than are ruling now. The action of the manufacturers in previous years, when reductions have been secured, furnish good grounds for this belief. The conflict between the larger and smaller Coke operators in the Connellsville region, to secure contracts for the last half of the year, has about come to an end. The larger operators succeeded in getting nearly all the business, but were compelled to meet the prices of the smaller producers, and in many cases go under them. The price has gradually declined and is now around the \$1.25 mark. Prices on many lines of Iron and Steel are merely nominal, as a buyer who can discount his bill can come pretty close to naming his own price.

Structural Material—A fair tonnage is going in Bridge Material, but the other kind of Shapes are in very slow demand. The works of the Columbia Iron & Steel Company and Jones & Laughlins, Limited, are both idle, awaiting settlement of the Steel scales. We quote as follows: Beams up to 15 inches, 1.50¢ @ 1.65¢, f.o.b. cars Pittsburgh. Angles and Universal Plates, 1.60¢ @ 1.70¢; Tees, 1.75¢ @ 1.85¢, and Z-Bars at 1.65¢ @ 1.70¢.

Plates.—A very small amount of new business is coming in, although a good many old orders remain unfilled, and these serve to keep the mills fairly busy. Repairs are being made at many plants and production will be considerably restricted during this month. We repeat quotations of last week as follows: Tank, 1.50¢ @ 1.60¢, according to order; Shell, 1.70¢ @ 1.80¢; Ordinary Fire Box, 2.25¢ @ 2.50¢; Special, 3¢ @ 3.50¢; Flange, 1.75¢ @ 2¢.

Ferromanganese.—There is no demand and we make nominal quotation of \$57.50 f.o.b. cars Pittsburgh for domestic.

Bars—Mills in the Pittsburgh district are largely closed for repairs and stock taking, and to await a settlement of the wage scale. In the Mahoning Valley the shut down is general and may possibly continue through August. It is the general opinion that the greater the restriction in output for the next month or six weeks the greater will the situation be benefited. About a dozen firms have signed the Iron scale, these being located principally in the South and West. The J. Painter & Sons Company is the only Pittsburgh concern who have signed so far. We quote Steel Bars at 1.45¢ @ 1.50¢, half extras, at mill. In the Mahoning Valley Bars are held firmly at 1.40¢, half extras, at mill, with some concerns asking 1.45¢.

Merchant Steel—A few season contracts have been placed for Implement Steel and specifications are in the market for more that will probably be closed within the next week or two. The other grades are in only moderate demand, with no marked change in prices. We quote as follows: Machinery, 1.90¢; Spring, 2¢ @ 2.10¢; Curved Sleigh

Shoe, 2½¢; Flat-Shaped Sleigh Shoe, 1.90¢; Tire, 1.90¢; Tool Steel 5¢ and upward, according to quality.

Muck Bar.—There is no demand and prices have declined to such an extent that makers claim it can no longer be sold at a profit. We quote at \$22.75 @ \$23 delivered at buyers' mill.

Pipes and Tubes—A little business is doing in the smaller sizes, but for Line Pipe and the larger sizes there is no inquiry. The works of the National Tube Works Company and the Pennsylvania Tube Works are idle for repairs, while the plant of the Duquesne Tube Works Company is closed on account of financial troubles. Attention is no longer paid to the official discount list, each manufacturer naming his own prices.

Wire Rods.—The works of the Pittsburgh Wire Company are in operation again, after a shut down of two weeks for repairs, and the Beaver Falls plant is also running. In the absence of sales, Rods may be quoted at \$28 @ \$28.50, Pittsburgh.

Wire and Cut Nails.—With the exception of the Beaver Falls mills, the Wire-Nail factories in the Pittsburgh and Cleveland districts are closed, and will remain so during July. Stocks are reported as light and rapidly diminishing, and it is believed the trade will be considerably benefited by the shut down. It is also the impression that prices will not go any lower, and may take an upward turn before long. We quote Wire Nails at \$1.35 in carload lots, and are advised that some concerns are asking \$1.40 in carload lots at mill. Cut Nails are in light demand, and are ruling at \$1.05 base, in carload lots at mill.

Sheets—The settlement of the Sheet scale insures steady operations among the mills just as soon as necessary repairs and stock-taking have been completed. We continue to quote: No. 24, 2.50¢; No. 26, 2.60¢ and No. 27, 2.70¢. Galvanized Sheets are in good demand, with discounts ruling at 70 % and 10 %. On desirable orders this discount is occasionally shaded.

Wire.—We quote Four-Point Galvanized at 2.30¢ @ 2.40¢, and Plain at 1.90¢ @ 2¢ in carload lots. Business is light, orders being for small lots only.

Connellsville Coke—Since the first of July a good many contracts for the last half of the year have been closed, and at prices ranging from \$1.30 to \$1.45, the last named price being secured in only a few instances. These low prices were brought about principally by the keen competition between the large and small operators to secure enough trade to keep them running the balance of the year. The larger operators offered as low and in many cases lower prices than the smaller operators and secured the bulk of the business. It is reported that several of the small operators are offering to make contracts as low as \$1.25 in preference to closing their ovens. At one of the works in the Connellsville region notices of a reduction in wages have been posted. The detailed report of the operation and output of the region for the week ending Saturday, July 1, shows 11,014 ovens in blast and 6319 idle, with a total estimated production of 102,245 tons. Compared with the production of the previous week this was a decrease of 5875 tons. Among the furnace operators 220 ovens were put out of blast. Both the Hill Farm and Parrish plants of the Dunbar Furnace Company sus-

pendent operations indefinitely. Their reason for blowing out is that they cannot secure enough Coke orders at a price that will justify running the plants and pay wages on the basis of \$1.90 per ton for Furnace Coke. Among the smaller operators considerable Coke is being stocked.

(By Telegraph, July 12, 12 25 p.m.)

Pig Iron.—The market is lifeless. It is expected, however, that the demand will soon show improvement, for the reason that operations will soon be resumed by the Steel plants and the Sheet mills. Reliable advices indicate that stocks in the hands of consumers are very light, and if a better demand comes it is thought that prices would soon show a firmer tendency:

Neutral Gray Forge.....	\$12.00 @ \$12.25, cash.
All-Ore Mill.....	12.00 @ 12.25 "
Bessemer Pig.....	13.15 @ 13.25 "
No. 1 Foundry.....	13.50 @ 13.75 "
No. 2 Foundry.....	12.50 @ 12.75 "
Charcoal Foundry No. 1.....	17.00 @ 18.00 "
Charcoal Foundry No. 2.....	16.50 @ 17.00 "

Billets—Now that Jones & Laughlins, Ltd., have signed the Steel scale, it is expected that other concerns in the Wheeling district will soon make settlements with their men, as several firms in that district have been waiting until a settlement was made by the above concern before commencing negotiations with their men. As yet the market is bare of sales, but with the sheet mills in operation and a good prospect of early settlement of the Iron scale, there will soon be some business. We make nominal quotation of \$21.25 @ \$21.50, at maker's mill.

Cleveland.

CLEVELAND, OHIO, July 10, 1893.

Iron Ore.—The sale of about 100,000 tons of Bessemer Ores from the Gogebic Range at \$3.75 per ton, f.o.b. vessels Cleveland, was the only feature of the market during the past week. The price paid is the same as has been steadily quoted in *The Iron Age* for the past two months, as against counter assertions that \$3.85 and \$4.10 were being paid for the same Ores. Other sales of Bessemer as low as \$3.60 @ \$3.70 per ton are reported, but the amounts involved were small. Current production seems to be the aim of nearly all the Iron Ore men; and, although more inquiries have been received from the furnacemen since July 1 than for any preceding ten days since May 15, the chief aim of the producers seems to be a reduction in expenses. In view of the fact that mines are being shut down right and left and that there is little or no call for new Ore from furnaces, estimates regarding the season's output have again been reduced. It would be no surprise if the amount of Ore forwarded from the mines this season did not exceed 3,000,000 tons. It will certainly not reach 5,000,000 tons unless there is an early and very decided change for the better in the Pig Iron situation. Only two or three of the big mines on the Gogebic range are being worked and production in the Menominee district has been correspondingly restricted. The stock piles at upper lake ports, however, are still large and it will require several weeks of active work to get down the Ore

already mined. Lake freights have declined to a point never before reached. Charters are to-day reported for Ashland tonnage at 60¢ per ton, an amount less than one half the figure claimed by the vesselmen in the spring. Escanaba tonnage at 50¢ is not difficult to obtain. The railroad people are making a brave effort to clean up the docks and have forwarded 36,000 tons of Ore to the furnaces last week as compared with 20,000 tons for the same week in 1892. We hear of a sale of non-Bessemer Ore at \$2.75 per ton, Cleveland.

Pig Iron.—The depression characterizing the market for the past few weeks continues without any indications at hand of an early improvement. Buyers are imitating the actions of the Ore men referred to in last week's review, in asking that shipments of material already purchased be deferred for a few weeks. No sales of any consequence are reported and prices are weaker than ever. Forge and Foundry Irons are particularly weak, while Bessemer are only in demand in limited quantities and at prices that mean nothing to the dealers. Nominal quotations are:

Nos. 1 to 6 Lake Superior Charcoal.....	\$16.00
Nos. 1, 2 and 3 Bessemer, per ton.....	\$13.25 @ 13.35
No. 1 Strong Foundry, per ton.....	13.75 @ 14.00
No. 2 Strong Foundry, per ton.....	13.00
No. 1 American Scotch, per ton.....	14.25
No. 2 American Scotch, per ton.....	13.25
Mahoning and Shenango Valley Neutral Mill Irons, per ton.....	12.00
Mahoning and Shenango Valley Red Short Mills, per ton.....	12.25

Muck Bars.—The market, while quite dull, is not entirely devoid of life. No. 1 Muck Bars are quoted at \$23.50 @ \$23.65, with the intimation given therewith that \$23.35 or \$23.40 would buy a substantial order.

Scrap.—The market continues very weak with little or no business reported. Wrought Turnings are quoted nominally at \$7.25 @ \$7.50; Axle Turnings at \$8.50; Cast Boring at \$5.50, and No. 1 Forge at \$12.25 @ \$12.50.

Old Rails.—Offerings of Old American are plenty at \$18 @ \$18.50.

Nails.—Dealers quote Wire Nails at \$1.50 @ \$1.55 from stock and \$1.35 per keg in carload lots.

Old Wheels.—Quotations for Old Car Wheels continue at \$14 @ \$14.50, with plenty of offers to sell.

Financial.

The financial situation has not very materially improved during the week under review. Money on call has fluctuated between 4 and 15 %, while practically nothing has been doing in time money, and the market for commercial paper has been very quiet. The bank statement issued on Saturday was more unfavorable than was expected, the reserve being down to \$5,102,000 below legal requirements. The aggregate loans of the New York banks are now about \$20,000,000 in excess of their deposits. Small quantities of Clearing House certificates were canceled early in the week, but somewhat larger amounts were taken out later on, so that now the total amount outstanding is close upon \$23,000,000. So long as better rates than 6 % are obtainable readily by the banks, it is not probable that considerable amounts of loan certificates will be canceled.

There has been a good deal of discussion during the week concerning the sums of money which the savings banks are supposed to have hoarded in order

to meet any heavy withdrawals of funds now that interest for the first half of the year is available. While it is conceded that probably some money has been withdrawn from circulation by being tied up in this way, the leading authorities insist that the aggregate is not very large. It is also reported that the trust companies have not accumulated exceptional quantities of cash, so that the only explanation for the scarcity of currency is that it is being hoarded in larger and smaller amounts all over the country. The sub-treasury has been making it uncomfortable for those banks who have been in the habit lately of presenting sub treasury checks to that institution direct instead of having them go through the Clearing House. The sub-treasury officials have begun to pay these checks in gold coin, the inconvenience of handling which is supposed to soon stop the practice.

The mint has bought a moderate amount of silver at 72 cents, at which price additional quantities have been sold in the open market. Considerable quantities of silver have been exported lately.

On the Stock Exchange Tuesday brought a very heavy break in prices, following a declining market on Monday, when liquidation by English holders was caused through some heavy failures in London. During the week the following declines have taken place:

St. Paul.....	66½ to 61
Lackawanna.....	143½ to 140
General Electric.....	71 to 61½
Lake Shore.....	120½ to 114
Louisville & Nashville.....	64½ to 61½
Manhattan.....	122½ to 116½
New York Central.....	100½ to 98½
Northern Pacific.....	12½ to 11½
Reading.....	15 to 14½
Union Pacific.....	24½ to 21
Western Union.....	81½ to 78½

Tennessee coal and iron sold as low as 12¢ on Tuesday.

The bond market has failed thus far to show any indications of heavy reinvestment of July interest.

The announcement of the Government crop report, which shows the expected decline in the condition of wheat, was followed by an unexpected break in wheat. The conspicuous feature of the crop report, however, is the noted improvement which has taken place in corn.

Coal Market.

On Monday, July 10, the various companies in the coal combination refused to accept orders for delivery during the remainder of July at any but July prices. Up to that date middle men and consumers found little or no difficulty in securing all the tonnage desired at June prices, and it is probable that a considerable portion of the contracts made before that date will be carried far into the present month, deliveries being made thereon. This in itself will have the tendency to weaken the position of the companies taken in regard to July prices. There are other and more potent causes which will militate against the carrying out of this policy. The trade is in the middle of the summer dullness, and in addition is beginning to feel seriously the effect of the business depression throughout the country. Producing interests count upon the West to absorb a heavy tonnage each summer in anticipation of a fall and winter demand. This relieves a very quiet tide-water market and renders the movement of coal normal. Despite the very low lake freight rates which have ruled, the movement of

Coal westward from Buffalo, the main shipping port, from January 1 to July 1 was 254,611 tons less than it was during the corresponding time in 1892.

All things considered the trade will hardly absorb the output of this month. This will either compel restriction or else force the companies to carry the stocks over the dull month of July into the still duller month of August. The future of the trade very largely depends upon the degree of unanimity of action among the companies. Relations thus far have been very harmonious, and at times when very trying conditions presented themselves. The middle summer is the test period of the year for the Coal trade. If it can be passed without a sacrifice in revenues, or the accumulation of large stocks, the future will be very bright, otherwise it will be anything but favorable. Producing interests have made the right start, and if adverse conditions are properly met, they will not be forced to recede from their position.

The Bituminous trade is very dull. The shutting down of mills and other manufacturing plants has intensified the midsummer quietude. The result has been that prices on the better grades of Coal, on all but contracted business, have dropped 5¢. The quotations now are: \$3.10, Amboys; \$2.50 from Philadelphia, and \$2.45 from Baltimore. The inferior classes of Coal, being in less demand, have suffered in a greater degree. The Philadelphia price is \$2 20 @ \$2.25.

A considerable percentage of the year's requirements has not yet been contracted. It is railroad tonnage, which is holding out for lower prices. Producers are ready to grant the same providing the main line railroads, which carry the Coal, will grant them a freight rebate. The Pennsylvania, Baltimore & Ohio and Reading, the carrying roads, have firmly refused to make any concessions, and their attitude at the present time indicates that they will not. If no signs of weakness are manifest, consuming railroads, who are now very short on tonnage, will be forced before the end of the month to buy at the highest figures.

The dullness and accompanying low prices cited has resulted in the closing of a class of mines whose margin of profit is small, and to whom an uninterrupted movement of Coal is a necessary condition to operation. This has had the result of improving transportation facilities. They are now pronounced to be very satisfactory. The less demand for ocean tonnage has reduced the high freight rates which ruled up to a week ago. They are now normal, at 75¢ @ 80¢ from Philadelphia and Baltimore, respectively, to New England ports.

Metal Market.

Copper.—No change in the general situation has taken place during the past week. Purchases by home consumers seem rather below the average, and export movement, drawing the line at deliveries on old contracts and consignments to Europe in expectation of a better market there than on this side of the Atlantic, has been comparatively light. In fact, the surface appearances are that despite the restriction upon output there is more than enough of Copper to go around, if, indeed, not some accumulation of stock in first hands. Certain it is that consumers have experienced no difficulty in securing supplies for delivery during the balance of this month and in August at

the minimum rates current last week, and that exchange contracts running through the remainder of the year have been offered at some concession. On sales in the regular way the trading basis has been 10½¢ for Lake Superior Ingot, 10¼¢ for Electrolytic, and 9¾¢ @ 10¢ for Common Casting Stock. Small parcels of some few brands realized a fraction more, but only in strictly exceptional instances.

Pig Tin.—The market has been a peculiar one in certain respects, reflecting rather severe depression from the weight of excessively burdensome holdings in some quarters; "bear" manipulation that served to aggravate matters for a time and subsequently a sharp upward turn in prices so engineered as to create the impression that the leading holders have not only secured very good control but are in a position to maintain the advantage as long as the duty of 4¢ @ 10 lb keeps Tin from coming to this country in any considerable quantity. At one time spot stock went at as low as 18½¢ in the regular way and at 18¼¢ under exceptional conditions of sale. July delivery, sellers' option, also dropped to 18½¢. Upon settlement of some contracts there was a sharp rally on Tuesday to 19¢ for spot stock, 19.35¢ for sellers' option the balance of this month, 19.80¢ for August, 20.10¢ for September delivery, with comparatively little speculative trading. At the same time about 175 tons were sold privately at 19.50¢ for August delivery, exchange terms, while some lots were offered for the same delivery, on closer terms, at 19¼¢. Wednesday's prices on 'change were 18.90¢ bid, 19.10¢ asked for spot; 19.12¢ asked for July and 19.60¢ for August delivery.

Pig Lead.—Prices have advanced somewhat and the market shows decided recovery in tone from the depression that prevailed during the early part of the period covered by last week's review. Fair-sized lots of Common Domestic realized 3.65¢; a few carloads went at as high as 3.70¢ and the offering of stock for shipment after the latter part of the current month has become remarkably light. The indications are that consumption is hardly up to the July average, but smelters offer in a manner suggesting that the amount of stock in their hands is moderate and that financial pressure has been relieved by late sales. The stock here is moderate, outside of the holdings of large consumers, and the latter interest, it is understood, are carrying less surplus than they usually have on hand at this season of the year. Selling prices at the close were 3.60¢ @ 3.65¢ for spot stock and early shipments, and 3.70¢ for late shipments.

Spelter.—In the market for this metal there has been no change whatever. Sales still run light and the demand drags in a wearisome manner, while the offering indicates that more or less accumulation of stock in smelters' hands has taken place this month. Ordinarily Western brands, however, are not offered openly at less than 4.20¢, landed here, but the appearances are that offers of 4.15¢ for near future shipments would be accepted.

Through the courtesy of a leading Western producer we are placed in a position to communicate the following details, showing the effect of the Kansas coal trouble and the depression in the Spelter trade. The Weir City, R. Lanyon & Co., S. H. Lanyon, W. & J. Lanyon, Rich Hill, Girard, Scammond, Glendale, Granby, New York and Pittsburgh plants represent a total of

105 furnaces. Of these 48 to 50 furnaces are now idle, two reports on one concern differing by two furnaces. Since the average product of a furnace is 2500 pounds, this represents a decline in production from full work of 60 tons daily, or say 1800 tons a month.

Antimony.—Jobbing distribution has been fair, but the movement otherwise continues light and the demand is slow. Prices are easy at 9½¢ for Hallett's, 10¼¢ @ 10½¢ for L X, and 10½¢ for Cookson's on the spot.

Tin Plate.—At intervals there has been rather better buying of ordinary Bessemer Coke Plates, chiefly by canners of vegetables and the trade demand for other varieties has shown slight improvement. However, the change has not been broad or general enough to have any pronounced effect upon the market, and close buyers who are in a position to pay prompt cash doubtless secure quite as good bargains as have been picked up at any time during the past month or six weeks. Future shipments continue in neglect, with hardly any interest displayed, except in special sizes, and nothing outside of common-place buying there. Spot quotations are as follows: Coke Tins—Penlan grade, IC, 14 x 20, scarce; J. B. grade, do., \$5.40; Bessemer full weight, \$5.30; light weights, \$5 @ \$5.02½ for 100 lb, \$4.90 for 95 lb, \$4.85 for 90 lb. Siemens Steel scarce. Stamping Plates—Bessemer Steel, Coke finish, IC basis, \$5.60; Siemens Steel, IC basis, \$5.65; IX basis, \$6.85. Charcoals—Melyn grade, IC, \$6.35 @ \$6.37½; Crosses, \$8; Allaway grade, IC, \$5.60; Crosses, \$6.80; Grange grade, IC, \$5.70; Crosses, \$6.85. Charcoal Ternes—Worcester, 14 x 20, \$5.70; do., 20 x 28, \$11.35; M. F., 14 x 20, \$7.25; do., 20 x 28, \$14.50; Dean grade, 14 x 20, \$5.30 @ \$5.37½; do., 20 x 28, \$10.50 @ \$10.60; D. R. D. grade, 14 x 20, \$5.10 @ \$5.15; do., 20 x 28, \$10.20; Alyn, 14 x 20, \$5.32½ @ \$5.35; do., 20 x 28, \$10.40; Wasters—S. T. P. grade, 14 x 20, \$4.87½; do., 20 x 28, \$9.25; Abercarne grade, 14 x 20, \$4.87½; do., 20 x 28, \$9.20.

New York.

Office of *The Iron Age*, 96-102 Reade street, }
NEW YORK, July 12, 1893. }

Pig Iron.—The market is exceedingly dull and there are numerous reports of concessions to effect sales. The very great reduction in the output shown by our statistical report, published elsewhere, may have some influence upon the market soon, particularly since it is known that a further restriction has gone on since the beginning of the month. Some very low prices are being made on Alabama Charcoal Iron, chilling numbers having been offered at \$14.25 at furnace, equivalent to \$18.25 here, while in Buffalo \$15.25 @ \$15.50 has been done for Lake Superior. We quote Northern brands at \$14.50 @ \$15 for No. 1; \$13.75 @ \$14.50 for No. 2; \$12.25 @ \$12.50 for Gray Forge at tidewater. Southern Iron, same delivery, \$13.75 @ \$14.50 for No. 1; \$12.50 @ \$13.50 for No. 2; \$12 @ \$12.25 for No. 3; \$12.25 @ \$12.50 for No. 2 Soft, and \$12.75 @ \$13.25 for No. 1 Soft; Gray Forge remains \$11.75 @ \$12.50.

Spiegeleisen and Ferromanganese.—The market is absolutely lifeless, with Ferromanganese nominally quoted at \$57 @ \$57.50 for 80 % foreign.

Billets and Rods.—Nothing has been done. We quote, nominally:

Domestic Billets, \$23.50 @ \$24, and foreign Billets \$23 50 @ \$29, tide-water; domestic Wire Rods, \$30.75 @ \$31 and foreign Rods, \$39 75 @ \$40.

Steel Rails.—Not only are no new orders coming in, but deliveries are being postponed, simply because the railroads are too poor to pay for the Rails. As it is, the mills will have practically nothing to do after the middle of next month, even when they are nursing what orders they have got. Quotations remain unchanged at \$29, mill or tidewater, standard section.

Track Material.—We quote: Spikes, 1.80¢ @ 1.90¢; Fish Plates, 1.45¢ @ 1.60¢; Track Bolts, Square Nuts, 2.30¢ @ 2.40¢, and Hexagon Nuts, 2.40¢ @ 2.50¢, delivered.

Manufactured Iron and Steel.—Outside of a moderate lot of Structural material for use in strengthening the Ninth Avenue elevated road no orders of any consequence have been placed. There is quite a fair demand, however, for small lots, prompt delivery, and the absence of active competition on the part of some of the Western mills makes it possible to secure somewhat better prices. We quote: Beams up to 15-inch, 1.85¢ @ 2¢; 20-inch, 2.10¢ @ 2.25¢, for round lots; Angles, 1.75¢ @ 1.90¢; Universal Mill Plates, 1.80¢ @ 1.90¢; Tees, 2¢ @ 2.15¢; Channels, 1.85¢ @ 2¢, on dock. Steel Plates are 1.70¢ @ 1.90¢ for Tank; 1.95¢ @ 2.10¢ for Shell; 2¢ @ 2.15¢ for Flange, and 2.50¢ @ 2.80¢ for Fire Box, on dock; Refined Bars are 1.60¢ @ 1.9¢, on dock, and Common 1.50¢ @ 1.60¢; Soft Steel Bars are 1.50¢ @ 1.6¢; Scrap Axles are quotable at 1.90¢ @ 2.10¢, delivered; Steel Axles, 1.85¢ @ 2¢, and Links and Pins, 1.85¢ @ 2.10¢; Steel Hoops, 1.80¢ @ 1.90¢, delivered; Cotton Ties, 80¢ @ 85¢ per bundle, at mill.

Old Material.—We quote Old Iron Rails at about \$15 @ \$15.50; Old Steel Rails, \$12.50 @ \$13; No. 1 Wrought Scrap Iron at \$15 @ \$15.50, and Car Wheels at \$11.50 @ \$12.

Ridiculously exaggerated reports have been current in the daily press concerning the Troy Steel & Iron Company. We are officially informed that one furnace, which has been in operation for a long time, will be blown out and that the other will be banked. The Bessemer Steel Works are idle, there being no demand for Billets at remunerative rates. All the other departments of the works—in other words, all the finishing trains—are in operation, and the company are filling orders in hand and are prepared to take work.

The carefully guarded percentages of outputs of the various producing companies have at last been brought to light. They are as follows:

	Percentage allotted.	Percentage shipped.
Reading.....	21.63	18.25
Lehigh Valley.....	15.97	16.12
Central R. R. of New Jersey.....	15.98	12.50
Lackawanna.....	15.54	16.20
Delaware & Hudson.....	10.65	10.02
Pennsylvania R. R.....	10.45	13.50
Pennsylvania Coal..	4.84	4.45
Erie.....	4.94	3.40
Coke.....	—	3.00

Dr. Walter Kempster, who for six months past has been traveling abroad for the United States Government, for the study of cholera and its prevention, is completing his report. Its substance is that it is possible to keep the cholera from a city when the surrounding towns are tainted or to keep it from any house in an infected city, provided proper precautions are taken.

British Iron and Metal Markets.

[Special Cable Dispatch to The Iron Age.]

LONDON, WEDNESDAY, July 12, 1893.

Block-Tin prices recovered during the early part of the week, in sympathy with the turn for the better in silver, but subsequently declined to £82. 5/ for Straits, prompt delivery, under renewed pressure to sell, caused by general financial uncertainties. Australian Tin is noticeably scarce, and realized £84. 10/ the past few days, or fully £2. premium over Straits. At the close, the latter was quoted at £82. 5/ @ £82. 7/6 for prompt delivery and £81. 5/ @ £81. 7/6 for three months' futures, with the market dull.

In Copper there was some advance during the fore part of the week, chiefly on the strength of better buying by consumers and some covering of "short" accounts by speculators, but free selling and somewhat urgent offering by a few dealers caused a break of 10/ @ 15/ from the highest point. At the close the market was quiet, with Merchant Bars quoted at £42. 15/ for prompt and £43. 5/ for future delivery, and Best Selected English at £48.

Pig Lead is firmer, with sales of English at £10. 5/ and foreign sorts at £10. 3/9. The advance was due to reports of probable lessening of output.

Spelter has undergone hardly any change. Business is slow, and price stands at about £17. 12/6 for ordinary Silesian.

Canadian orders for Tin Plate have been somewhat better, but the prices offered were generally so low as to preclude business in other than small lots. From other quarters the demand continues very moderate. Exports last month were 37,000 tons against 34,000 tons in June, 1892. The quantity shipped to the United States was 26,000 tons and 23,000 tons respectively. Liverpool prices are as follows:

IC Charcoal, Alloway grade.....	13/0 @ 13/6
IC Bessemer Steel, Coke finish.....	12/0 @ ..
IC Siemens.....	12/3 @ ..
IC Coke, B V. grade, 14 x 20.....	11/9 @ 12/
Charcoal Terne, Dean grade.....	11/9 @ 12/

Steel Rails are firmer, and makers now generally ask £3. 17/6 for heavy sections. In other branches of the Steel trade business has been quiet and unchanged.

Pig Iron exports last month were 81,000 tons, against 58,000 tons in June, 1892, but the market shows little change in tone. Last sales of warrants were at 41/9 for Scotch, 35/1½ for Cleveland, and 45/ Hematite.

A highly interesting armor test was made in Washington on last Tuesday on one of the curved barbette plates for the "Indiana," made by the Bethlehem Iron Company. It was the heaviest plate yet tested, its dimensions being 8 feet 4 inches in height, 12 feet 1 inch in length and 17 inches in thickness, the

weight being 31½ tons. It was subjected to attack from a 12-inch rifle, which threw a monster Carpenter shell weighing 850 pounds. Its muzzle was 319 feet from the face of the plate. The striking velocity of the first shot was 1322 feet a second, and it penetrated to a depth of 16.6 inches, lacking less than ¼ inch of going through. The second shot was fired with a velocity of 1495 feet a second and went three inches into the oak backing. The third and last shot was to determine whether or not the premium was to be paid, and the velocity was raised to 1858 feet a second. The shell had gone clear through the plate and 36 inches of oak backing. The plate scoured for its makers the acceptance of the whole contract, amounting to from 500 to 700 tons, but earned no premium. It showed no cracks under the terrific strain to which it had been subjected.

Even more satisfactory than the showing made by the plates was that of the projectiles. The 8-inch shells were of the Holtzer conical pattern, and the 12-inch ones of the Carpenter conical pattern. All four of the shells that were recovered appeared wholly unchanged to the unpracticed eye of the layman, and the gauge showed that they were disturbed to such a small degree that they might again be fired with the attachment of a new strip of rifling. Some idea of the force with which the shells struck the face of the plates may be gained from the fact that the energy of the last shot fired was equivalent to the force necessary to move a mass of 21,600 tons through 1 foot of space.

George F. Brandan of Cohoes, N. Y., has invented a car brake which may be used either on steam or electric roads. The brake consists of a shoe with a frame made of iron which comes into contact with both the car wheel and the rail at the same time. A cable aids in the adjustment of the brakes, which is operated by the motor. A test of the new invention has been made on the Troy, N. Y., city railroad.

The manufacture of the Krag-Jorgensen rifle, with which first the regular army and afterward the National Guard regiments are to be equipped, has been begun at the Springfield armory. It is expected to replace the old Springfield rifle now in use in the army in about 18 months. The new weapon weighs only 8½ pounds, and its barrel, 30 inches in length, is rifled with four grooves. The bullet of 220 grains is propelled by 37 grains of smokeless powder. It is unlubricated, covered with nicked steel and is of such high velocity and penetration that when it strikes a bone it passes through without shattering it. It kills or disables more effectively than the old missile, but is more humane in that the chances of recovery from its cleaner wounds are far greater.

The Board of Arbitration, composed of John Little, Xenia, Ohio; J. Bishop and Judge Owens, Columbus, appointed by Governor McKinley, settled the wage question of the Belmont & Pittsburgh Coal Company at a meeting held in Bellaire on Friday, the 7th inst. They compromised after two days session. The companies are to hold six days' wages back from the miners every four pay days. The settlement meets with the favor of all the miners.

HARDWARE.

Condition of Trade.

JULY is generally regarded as, perhaps, the dullest month in the year, when trade is characterized by a midsummer quietness. The present month promises to be no exception. Manufacturers are, many of them, shut down for repairs or improvements and some of them to avoid undue accumulation of stocks. Many others whose works are in operation are curtailing their production and refraining from running to their full capacity. A disposition prevails to avoid piling up stock, and it appears probable that during the present month the amount of goods manufactured will be considerably below the average. Manufacturers are induced to adopt this course on account of the present moderate demand and the uncertainty as to when trade may be expected to assume its regular volume, and also on account of the present financial stringency, which induces conservative action on their part. At the same time, it should be borne in mind that there is a considerable amount of business doing, and in some lines manufacturers have not much more than caught up with their orders. It appears evident, looking over the trade of the past six months, that its volume in many lines compares well with that of the same period in other years, and some manufacturers report it as having been exceptionally good, notwithstanding the financial disturbance. With the turn of the half-year but few changes in prices are announced, and while the market is not strong and some manufacturers would be willing to accept orders at slight concessions from former prices, quotations are on the whole well sustained. In the following pages we give advices from the trade throughout the country, which will be of service to those who are desirous of taking a comprehensive view of the situation, informing them in regard to the way in which the present condition of business and the outlook for trade are regarded by representative merchants in the different States.

Chicago.

(By Telegraph.)

The financial situation has improved somewhat, making collections better,

but trade otherwise is discouragingly dull. The statement may be an exaggeration of the condition of business, but some houses report their daily orders for the past week or two hardly balancing their daily expenses. They look forward to a heavy volume of business later to compensate for the dullness now, but think it may be necessary to wait until crop prospects are more settled. World's Fair visitors are becoming more numerous in the Hardware trade, but they are buying very little, evidently coming here for recreation alone. Prices show no material change, but there appears to be a disposition to make concessions on Tin Plate, and prices are a little easy on Coke brands.

St. Louis.

(By Telegraph.)

Midsummer dullness prevails in the Hardware trade, and it is difficult to find anything interesting to report. A fair business only is reported by all the leading jobbers. The retail trade is dead dull, and looks as if it will remain so during the next 60 days. There is no large buying in any lines, dealers restricting their purchases to their immediate needs. Sheet Iron and Galvanized are being ordered in good quantities. Barb Ware and Wire Nails are weak and orders are difficult to obtain. Collections are, of course, dull, but could be considerably worse.

Notes on Prices.

Cut Nails.—The Cut Nail market is inactive and many of the mills are shut down. Several of them are, however, in operation. Prices are without change on a basis of \$1.05 for carload lots at mill, which, however, would doubtless be slightly shaded in some cases under pressure. Small lots of either Iron or Steel Nails from store in New York are quoted regularly at about \$1.80.

Chicago, by Telegraph.—Cut Steel Nails are rather quiet in this particular locality, but good orders are being received from distant points, showing that trade is better there than here. Notwithstanding this, efforts are being made by outside manufacturers to force local trade, and reports are current of concessions being offered. The claim is made that such concessions are based on averages, the intention being to dispose of accumulations of small Nails. Regular quotations here for factory lots are continued at \$1.20 to \$1.25. Jobbers are quoting small lots from stock at \$1.30 in a regular way and \$1.25 for quantities.

Wire Nails.—Business in Wire Nails is very light. Mills are generally shut down in accordance with the understanding reached a month ago. Their disposition is to pursue a conservative course and avoid the accumulation of stock in the hope that the diminished production and possible scarcity, if business should improve, would enable them to obtain better prices. The quotation continues \$1.35 for carload lots at mill. Small lots from store in New York are held at about the usual advance.

Chicago, by Telegraph.—Although the shutdown of the factories has lasted but little more than a week, manufacturers' stocks have already been broken, and some of them are buying from the others in order to fill contracts standing on their books. Inquiries are also being received from large buyers for good quantities. Sales have therefore improved to some extent since our last report, and the future seems more hopeful. Factory lots are quoted at \$1.45, Chicago, and this is now claimed to be the lowest price offered by standard mills. Local jobbers find their business affected by the pronounced dullness in building circles, but have made no change in their prices, which are \$1.60 regular and \$1.55 for quantities.

Barb Wire.—The Barb-Wire market is decidedly sluggish, and very little is doing. Prices are unchanged at \$2.45 to \$2.50 for carload lots at mill.

Chicago, by Telegraph.—The movement from factories is very light and new orders have almost ceased. The mills, however, will remain shut down for some time, so that the dullness of trade can easily be borne for the present. Quotations continue at \$2.15 for carload lots of Painted and \$2.55 for Galvanized. Jobbers report their trade extremely quiet, with prices unchanged at \$2.30 and \$2.70, respectively.

The Smokeless Frying Pan.—W. E. Beveridge, 305 South Sharp street, Baltimore, is manufacturing this article, which was described in a recent issue. It is sold from the following list, which is subject to a discount of 33½ per cent. in dozen lots.

No. 8.....	\$1.00
No. 9.....	1.15
No. 10.....	1.25

Confection Scales.—A description of these Scales was given in our last issue as put on the market by John Chatillon & Sons, 85-93 Cliff street, New York. This Scale is sold to the trade at \$25, subject to a discount of 50 per cent.

Cabinet Locks—In view of the new competition in Cabinet Locks the trade are watching the market carefully to discover whether former prices are likely to be maintained. Thus far there have been no important developments, but it is understood that some lower prices have in some cases been made.

Cordage.—The Cordage market gives indications of a slight weakness and prices are a shade lower than at our last report. The market is represented by the following quotation for round lots, f.o.b. factory or New York, subject to a cash discount of $1\frac{1}{2}$ per cent.:

	Basis.
Manila.....	\$0.08 $\frac{1}{2}$ @ \$0.08 $\frac{1}{2}$
Sisal.....	.07 @ .07 $\frac{1}{2}$
New Zealand.....	.06 $\frac{1}{2}$ @ .06 $\frac{1}{2}$

Binder Twine is moving freely and without important change in price.

Common Sense Bead Fastener—The Common Sense Bead Fastener, described in our last issue and manufactured by the McMillan Sash Balance Company, Pittsburgh, Pa., is sold to the trade at \$6 per gross.

Clothes Wringers.—We give below the new list of the Lovell Mfg. Company, Erie, Pa., for whom William H. Quinn & Co., 103 Chambers street, New York, are agents. This list, which is contained in their catalogue, reference to which is made in another column, covers their complete line of Clothes Wringers, to which numerous additions have recently been made, including a number of goods of similar pattern to those of other manufacturers with which the trade are familiar. A very complete line is thus being manufactured by the company, who make the point that they are now putting on the market a variety which covers all the requirements of the trade, so that merchants can obtain their full supply of them. Their list is as follows and is subject to a discount of $12\frac{1}{2}$ per cent., terms f.o.b. Erie, 60 days, or 2 per cent. discount for cash in 10 days:

Happy Thought Wringer.

Patent Roller Bearings. Regular Width Swing Clamps.	
No. 110, 10 x $1\frac{1}{4}$ rolls, per doz....	\$32.00
No. 112, 11 x $1\frac{1}{4}$ " " " " " "	33.00
No. 114, 12 x $1\frac{1}{4}$ " " " " " "	44.00

Regular Width Reversible Clamps.	
No. 118, 11 x $1\frac{1}{4}$ rolls, per doz....	\$44.00
No. 120, 12 x $1\frac{1}{4}$ " " " " " "	52.00

3-inch Reversible Clamps.	
No. 118 M, 11 x $1\frac{1}{4}$ rolls, per doz....	\$45.50
No. 120 M, 12 x $1\frac{1}{4}$ " " " " " "	53.50

Wide Reversible Clamps for Porcelain Tubs.	
No. 118 W, 11 x $1\frac{1}{4}$ rolls, per doz....	\$47.00
No. 120 W, 12 x $1\frac{1}{4}$ " " " " " "	55.00

Bench Wringer, Pat. Roller Bearings, Folding Bench that folds up at each side of Wringer.	
No. 110 B, 10 x $1\frac{1}{4}$ rolls, per doz....	\$48.00
No. 112 B, 11 x $1\frac{1}{4}$ " " " " " "	54.00
No. 114 B, 12 x $1\frac{1}{4}$ " " " " " "	60.00
No. 118 B, 12 x $1\frac{1}{4}$ " " " " " "	60.00
No. 120 B, 12 x $1\frac{1}{4}$ " " " " " "	68.00

Good Idea Wringer.

Patent Roller Bearings. Regular Width Swing Clamps.	
No. 102, 10 x $1\frac{1}{4}$ rolls, per doz....	\$29.00
No. 103, 11 x $1\frac{1}{4}$ " " " " " "	33.00
No. 104, 12 x $1\frac{1}{4}$ " " " " " "	37.00

Improved Continental.

Regular Width Swinging Clamps.	
No. XX, 2 $\frac{1}{2}$, 10 x $1\frac{1}{4}$ rolls, per doz....	\$24.00
No. XX, 2, 10 x $1\frac{1}{4}$ " " " " " "	28.00
No. XX, 1 $\frac{1}{2}$, 11 x $1\frac{1}{4}$ " " " " " "	29.00
No. XX, 1 $\frac{1}{2}$, 11 x $1\frac{1}{4}$ " " " " " "	34.00
No. XX, 1 $\frac{1}{4}$, 12 x $1\frac{1}{4}$ " " " " " "	34.00

Double Sided Frame, Regular Width Reversible Clamps.	
No. XX, 1 $\frac{1}{2}$ R, 11 x $1\frac{1}{4}$ rolls, per doz....	\$36.00
No. XX, 1 R, 12 x 2 rolls, per doz....	54.00
No. XX, 3 R, 14 x 2 " " " " " "	75.00

Double Sided Frame, Reversible Clamps, take in 3 inches.	
No. XX, 1 $\frac{1}{2}$ M, 11 x $1\frac{1}{4}$ rolls, per doz....	\$37.50
No. XX, 1 M, 12 x 2 rolls, per doz....	55.50
No. XX, 3 M, 14 x 2 " " " " " "	76.50

Double Sided Frame, Wide Reversible Clamps for Porcelain Tubs.	
No. XX, 1 $\frac{1}{2}$ W, 11 x $1\frac{1}{4}$ rolls, per doz....	\$39.00
No. XX, 1 W, 12 x 2 rolls, per doz....	57.00
No. XX, 3 W, 14 x 2 " " " " " "	78.00

New Princess.

Regular Width Swing Clamps.	
No. 10, 10 x $1\frac{1}{4}$ rolls, per doz....	\$24.00
No. 12, 11 x $1\frac{1}{4}$ " " " " " "	29.00
No. 14, 12 x $1\frac{1}{4}$ " " " " " "	34.00
No. 16, 10 x $1\frac{1}{2}$ " " " " " "	28.00
No. 18, 11 x $1\frac{1}{2}$ " " " " " "	34.00
No. 20, 12 x $1\frac{1}{2}$ " " " " " "	44.50
No. 22, 10 x 2 " " " " " "	34.00
No. 24, 11 x 2 " " " " " "	44.50
No. 26, 12 x 2 " " " " " "	52.00
No. 28, 14 x 2 " " " " " "	78.00

Double Sided Frame. Regular Width Reversible Clamps.	
No. 18 R, 11 x $1\frac{1}{4}$ rolls, per doz....	\$36.00
No. 20 R, 12 x $1\frac{1}{4}$ " " " " " "	46.50
No. 22 R, 10 x 2 " " " " " "	36.00
No. 24 R, 11 x 2 " " " " " "	46.50
No. 26 R, 12 x 2 " " " " " "	54.00
No. 28 R, 14 x 2 " " " " " "	75.00

Doubled Sided Frame. Medium Wide Reversible Clamps, take in 3 inches.	
No. 18 M, 11 x $1\frac{1}{4}$ rolls, per doz....	\$37.50
No. 20 M, 12 x $1\frac{1}{4}$ " " " " " "	48.00
No. 22 M, 10 x 2 " " " " " "	39.50
No. 24 M, 11 x 2 " " " " " "	48.00
No. 26 M, 12 x 2 " " " " " "	55.50
No. 28 M, 14 x 2 " " " " " "	76.50

Double Sided Frame. Extra Wide Clamps for Porcelain Tubs.	
No. 18 W, 11 x $1\frac{1}{4}$ rolls, per doz....	\$39.00
No. 20 W, 12 x $1\frac{1}{4}$ " " " " " "	49.00
No. 22 W, 10 x 2 " " " " " "	41.00
No. 24 W, 11 x 2 " " " " " "	49.00
No. 26 W, 12 x 2 " " " " " "	57.00
No. 28 W, 14 x 2 " " " " " "	78.00

Extension Clamps for Porcelain Tubs.	
No. 18 P, 11 x $1\frac{1}{4}$ rolls, per doz....	\$45.00
No. 26 P, 12 x 2 " " " " " "	65.00
No. 28 P, 14 x 2 " " " " " "	85.09
No. 30 P, 14 x $2\frac{1}{4}$ " " " " " "	128.00

Folding Bench that folds up at each side of the Wringer.

No. 10 B, 10 x $1\frac{1}{4}$ rolls, per doz....	\$44.00
No. 12 B, 11 x $1\frac{1}{4}$ " " " " " "	49.00
No. 14 B, 12 x $1\frac{1}{4}$ " " " " " "	53.00
No. 16 B, 10 x $1\frac{1}{2}$ " " " " " "	48.00
No. 18 B, 11 x $1\frac{1}{2}$ " " " " " "	53.00
No. 20 B, 12 x $1\frac{1}{2}$ " " " " " "	60.00
No. 22 B, 10 x 2 " " " " " "	53.00
No. 24 B, 11 x 2 " " " " " "	60.00
No. 26 B, 12 x 2 " " " " " "	72.00

For Stationary Tubs, Reversible Water Boards. Regular Width Wooden Clamps.

No. 18 S, 11 x $1\frac{1}{4}$ rolls, per doz....	\$44.50
No. 26 S, 12 x 2 " " " " " "	65.00
No. 28 S, 14 x 2 " " " " " "	85.00
No. 30 S, 14 x $2\frac{1}{4}$ " " " " " "	128.00

For Stationary Tubs, Reversible Water Board. Wide Wooden Clamps.

No. 18 A, 11 x $1\frac{1}{4}$ rolls, per doz....	\$46.00
No. 26 A, 12 x 2 " " " " " "	66.50
No. 28 A, 14 x 2 " " " " " "	86.50
No. 30 A, 14 x $2\frac{1}{4}$ " " " " " "	129.50

For Stationary Tubs, Reversible Water Board and Extension Clamps, for Porcelain Tubs.

No. 18 E, 11 x $1\frac{1}{4}$ rolls, per doz....	\$48.00
No. 26 E, 12 x 2 " " " " " "	68.00
No. 28 E, 14 x 2 " " " " " "	88.00
No. 30 E, 14 x $2\frac{1}{4}$ " " " " " "	131.00

Princess.

Swing Clamps, Central Pressure Screw.	
No. 10 $\frac{1}{2}$, 10 x $1\frac{1}{4}$ rolls, per doz....	\$24.00
No. 12 $\frac{1}{2}$, 11 x $1\frac{1}{4}$ " " " " " "	29.00
No. 14 $\frac{1}{2}$, 12 x $1\frac{1}{4}$ " " " " " "	34.00

Princess Bench Wringer—With Folding Bench.

No. 10 $\frac{1}{2}$ B, 10 x $1\frac{1}{4}$ rolls, per doz....	\$34.00
No. 12 $\frac{1}{2}$ B, 11 x $1\frac{1}{4}$ " " " " " "	39.00
No. 14 $\frac{1}{2}$ B, 12 x $1\frac{1}{4}$ " " " " " "	44.00

Geneva Purchase Gear Wringer.

Regular Width Clamp.	
No. 203, 10 x $1\frac{1}{4}$ rolls, per doz....	\$36.00
No. 204, 11 x $1\frac{1}{4}$ " " " " " "	45.00
No. 204 $\frac{1}{2}$, 11 x $1\frac{1}{4}$ rolls, per doz....	47.00
No. 205, 12 x $1\frac{1}{4}$ " " " " " "	50.00
No. 206, 12 x $1\frac{1}{2}$ " " " " " "	58.00

Wide Clamps for Stationary Tubs.	
No. 204 $\frac{1}{2}$ A, 11 x $1\frac{1}{4}$ rolls, per doz....	\$54.00
No. 206 A, 12 x $1\frac{1}{4}$ " " " " " "	60.00

Extension Clamps for Porcelain Tubs.	
No. 204 $\frac{1}{2}$ B, 11 x $1\frac{1}{4}$ rolls, per doz....	\$64.00
No. 206 B, 12 x $1\frac{1}{4}$ " " " " " "	70.00

Bench Wringer.—Folding Bench that folds up at each side of the Wringer.

No. 203, B, 10 x $1\frac{1}{4}$ rolls, per doz....	\$54.00
No. 204, B, 11 x $1\frac{1}{4}$ " " " " " "	62.00
No. 204 $\frac{1}{2}$ B, 11 x $1\frac{1}{4}$ rolls, " " " " " "	65.00
No. 205, B, 12 x $1\frac{1}{4}$ " " " " " "	63.00
No. 206, B, 12 x $1\frac{1}{2}$ " " " " " "	72.00

Invincible.

Wooden Frame, Steel Spring.	
No. 40, 10 x $1\frac{1}{4}$ rolls, per doz....	\$29.00
No. 42, 11 x $1\frac{1}{4}$ " " " " " "	34.00
No. 44, 12 x $1\frac{1}{4}$ " " " " " "	39.00

Swan.

Iron Frame, with Steel Spring.	
No. 3 $\frac{1}{2}$, 10 x $1\frac{1}{4}$ rolls, per doz....	\$28.00
No. 4 $\frac{1}{4}$, 11 x $1\frac{1}{4}$ " " " " " "	33.00
No. 5 $\frac{1}{2}$, 12 x $1\frac{1}{4}$ " " " " " "	38.00

Improved Rockford.

Wooden Frame, Swinging Iron Clamps.	
No. XX 3, 10 x $1\frac{1}{4}$ rolls, per doz....	\$22.00
No. XX 13, 11 x $1\frac{1}{4}$ " " " " " "	28.00
No. XX 23, 12 x $1\frac{1}{4}$ " " " " " "	34.00

Brighton.

Wooden Frame, Swinging Iron Clamps.	
No. 5, 10 x $1\frac{1}{4}$ rolls, per doz....	\$21.00
No. 15, 11 x $1\frac{1}{4}$ " " " " " "	25.50
No. 25, 12 x $1\frac{1}{4}$ " " " " " "	30.00

Newport.

Wooden Frame and Clamps	
No. 7, 10 x $1\frac{1}{4}$ rolls, per dozen....	\$20.50
No. 17, 10 x $1\frac{1}{4}$ " " " " " "	21.00
No. 27, 11 x $1\frac{1}{4}$ " " " " " "	25.50

Hartford.

Wooden Frame and Clamps.	
No. 9, 10 x $1\frac{1}{4}$ rolls, per dozen....	\$20.50
No. 19, 10 x $1\frac{1}{4}$ " " " " " "	21.00
No. 29, 11 x $1\frac{1}{4}$ " " " " " "	25.50

Hartford Bench.

Folding Bench that folds up at each side of the Wringer.	
No. 9 B, 10 x $1\frac{1}{4}$ rolls, per dozen....	\$40.00
No. 19 B, 10 x $1\frac{1}{4}$ " " " " " "	41.00
No. 29 B, 11 x $1\frac{1}{4}$ " " " " " "	46.00

Old Reliable.

No. 2, 10 x $1\frac{1}{4}$ rolls, per dozen....	\$21.00
No. 3, 11 x $1\frac{1}{4}$ " " " " " "	25.00
No. 4, 12 x $1\frac{1}{4}$ " " " " " "	30.00
No. 5, 14 x $1\frac{1}{4}$ " " " " " "	41.00
No. 6, 16 x 2 " " " " " "	50.00

L. M. Co.

No. 2, 10 x $1\frac{1}{4}$ rolls, per doz....	\$19.50
No. 3, 11 x $1\frac{1}{4}$ " " " " " "	24.00
No. 4, 12 x $1\frac{1}{4}$ " " " " " "	28.00
No. 5, 14 x $1\frac{1}{4}$ " " " " " "	39.00
No. 6, 16 x 2 " " " " " "	49.00

Cottage.

No. 2, 10 x $1\frac{1}{4}$ rolls, per doz....	\$20.00
No. 3, 11 x $1\frac{1}{4}$ " " " " " "	24.00
No. 4, 12 x $1\frac{1}{4}$ " " " " " "	28.00

Superb.

No. 2, 10 x $1\frac{1}{4}$ rolls, per doz....	\$18.50
No. 3, 11 x $1\frac{1}{4}$ " " " " " "	22.50
No. 4, 11 x $1\frac{1}{4}$ " " " " " "	26.50

Globe.

No. 2, 10 x $1\frac{1}{4}$ rolls, per doz....	\$13.50
No. 3, 11 x $1\frac{1}{4}$ " " " " " "	22.50
No. 4, 12 x $1\frac{1}{4}$ " " " " " "	26.50

Steel Sash Pulleys.—The Fox Mfg. Company, Grand Rapids, Mich., manufacture these goods. The Pulleys are sold f.o.b. Grand Rapids at the following net prices:

Plain Pulleys, per dozen, by barrel....	\$0.25
Corrugated Pulleys " " " " " "	.25
Less than barrel lots.....	.30

The company also manufacture machines and tools for applying the pulleys, which are sold f.o.b. Grand Rapids at net prices as follows:

Double Machine for mortising plain pulley.....	\$125.00
Double Machine for setting plain pulley.....	40.00
Single Hand Pliers for setting plain pulley.....	1.00
Single Saws for mortising plain pulley, each.....	2.00
4-hole Boring Machines, for corrugated pulleys.....	60.00
4-hole Bit, for use in ordinary boring machine, for corrugated pulleys.....	25.00
4-hole Markers, each, for corrugated pulleys.....	.50
Sets, each, for corrugated pulleys.....	.10
Extra for Nickel, Copper or Bronze Plate, 10 cents per dozen.	

Winchester Repeating Shot Gun.—

The Winchester Repeating Shot Gun, model 1893, manufactured by the Winchester Repeating Arms Company, New Haven, and illustrated in this issue, is sold from the following list, which is subject to a discount of 25 and 10 and 5 per cent.:

Fine 4-Blade Damascus Barrel, Fancy Walnut Stock, Checked Rubber Butt.....	\$62.00
Winchester Repeating Shot Gun, model 1893, rolled steel barrel, with plain pistol grip stock, 30 or 32 inch barrel, 12 gauge.....	25.00
Fancy Walnut Stock and Forearm, not checked, extra.....	10.00
Checking Stock.....	4.00
Extra Length or Drop of Stock, to order.....	10.00
Rubber Butt Plate.....	2.00
Good (3 blade) Damascus Barrel (additional).....	15.00
Fine (4 blade) Damascus Barrel (additional).....	20.00

Glass.—The condition of the Glass trade is usually one of quiet at this season of the year, and the present time shows no exception to the rule. Conditions are not favorable for a large volume of business and orders are small, covering only present necessities. Considerable attention is being paid to the collection of accounts, and the financial standing of customers is carefully scrutinized before goods are shipped. Such conservative action on the part of both the retailer and jobber cannot fail to bring about good results, as small stocks and unimpaired credit will give an impetus to trade when financial confidence is restored. The trouble in making collections to meet immediate obligations has not deranged prices, and goods are billed at regular quotations. It is reported that the wage committee of Glass workers and manufacturers were to meet in New York July 12 to consider the scale of wages for the coming fire. The impression prevails that the plants will make an early start if a satisfactory agreement is arrived at. Quotations on Glass remain unchanged, as follows: American Window Glass, 2000 boxes at one time, 80 and 10 and 10 per cent. discount; carloads, 400 boxes, 80 and 15 per cent. discount; less quantities than carloads, 80 and 10 per cent. discount. Freight allowed on car lots and over, not to exceed 17½ cents per 100 pounds; less than car lots, f.o.b. at shipping point. French Window Glass, 75 and 10 and

5 per cent. discount. American Plate ranges in price from 50 and 10 and 7½ per cent. discount to 60 and 5 per cent. discount. Imported Plate Glass, 60 per cent. discount to 60 and 10 and 5 per cent. discount.

Export Notes.

A NEW YORK exporting house of much experience, handling American products, has recently shipped an order for Band Iron aggregating 1500 bundles and weighing 67,000 pounds. They also report good orders for Merchant and Bar Iron, square, round, angles and various shapes of miscellaneous sizes and dimensions in addition to a shipment of three carloads of Boiler Plate, not long since. Their orders have run in 50 to 150 bundle lots of a size or kind, and so far, although competing directly with English manufacturers, have not had a complaint as to quality. Out of 250 letters sent to foreign clients in this trade all but 10 per cent. responded in some form or other, showing a desire to trade here if their wants can be met.

We know of an instance where a first order for a case of sheet metal to be used in the arts abroad, amounting to but \$32, was received and properly executed. On its arrival out, care having been taken to follow directions, &c., it was quickly followed by a second order of 40 cases of the same goods, of a total value of \$900. This is not only another instance of the wisdom of properly filling an order in all its details, without regard to the value of the invoice, but is evidence of a practical character that our neighbors in the West Indies, Central and South America can be induced to largely increase their purchases with us, if we will but note their explicit commands and follow directions.

Theile & Quack, exporters, of this city, are said to have been made the consignees here for Aguirre & Co., Neiva and Bogota, United States of Colombia, who are shippers of hides and coffee. These goods will be paid for largely, if not entirely, with American Hardware and manufactured products.

An incident occurred recently which indicates somewhat the extent of progress trade is making with commercial houses in Spanish America affected by some of the reciprocity treaties now in operation. A buyer came to this city with memoranda for a line of iron of various kinds, amounting in all to 20 carloads. After much inquiry and the receipt of numerous quotations the orders were left here, whereas formerly they had been executed in England and on the continent. This is referred to by those interested as showing that mill men are coming to see the value of securing these orders, and

are now working in harmony with those able from many years of experience to influence such orders.

It may not be generally known that one reason assigned for the great lead American Axes have in the Australasian market came about, in part at least, in this way. Some of the wood cut there is extremely hard and very trying to tempered steel. Some time before American Axes had been introduced there great trouble had been experienced in turning out an axe so tempered that it would stand being swung into frozen trees in the Maine woods. The experiments and great care taken in tempering finally resulted in producing a really superior article, which, when tried on the Australian hardwood referred to made an impression both on the tree and the buyer.

The senior partner of Castle & Crook of Honolulu, importers of general Hardware, is now in this country on business as well as to visit the exposition.

H. T. Mot of Paris, dealer in American Agricultural Implements, has been visiting here and is about to return to France.

Wm. McKenzie of Thos. McKenzie & Sons, Dublin and Liverpool, handlers of American Hardware, returned to the United Kingdom by the steamer "Umbria," July 8, after a visit to manufacturers and the fair.

Local Checks.

WE ARE IN RECEIPT of another letter from the correspondent in Virginia whose letter in regard to the payment of bills by checks on local banks called out the communication in our last issue from a "Long-Suffering Jobber." In this letter our Virginia correspondent takes exception to the position of the jobber in which reference is made to the method of paying with local checks as "a system of petty robbery." Our correspondent then continues:

I will call his attention to the fact that he has overlooked the strongest point in my article, which was that in trade as in war it is useless to complain of your adversary's manner of conducting the campaign, and that the only thing to be done is to apply such remedies or acts of retaliation as are at hand, and this the "Long Suffering Jobber" can do by returning the checks to those who send them to him. If he is thoroughly consistent and really wishes to keep out of their hands, let him instruct his salesmen not to solicit their business, and further let him erase their names from his list of those to whom to send circulars, and we opine that he will not be longer a victim of such injustice.

Touching upon the same subject we have the following communication from a prominent New England manufacturer, in which it will be seen that while our correspondent disapproves of the payment of accounts by local checks, he is pleased to receive them and to pocket the loss entailed in their collection:

I have read with interest the communications from "Banker" and "Retailer" and the replies thereto. Unquestionably "Banker" is right, and local checks do not pay in full, but are an imposition on the creditor or his bank of whatever the cost of collection may be. To be strictly just, the debtor in sending them to a distance should make them payable "with exchange," which makes them worth par anywhere (if of any size). Amounts less than \$1 should be sent in postage stamps.

Ten years or more ago we used to complain of local checks. We do so no more, and are only too well pleased if customers in the United States or Canada send us local check promptly when bill is due. Not that it is right, for customers should send funds worth par, but the custom is growing with many buyers. Some do not think and others do not care. Others are ignorant—for instance, the man who sends New York draft for \$49.75 to pay a bill of \$50, charging the exchange to his creditor.

How a Medal Was Won.

THE INSIDE HISTORY of how a foreign maker of Axes did not secure a medal almost within his grasp, at one of the world's expositions held in Paris some years ago, recently came to our notice on good authority. An American professor, well known in metallurgy, was in charge of the exhibit of a large Axe manufacturing concern, and it became known to him that the coveted medal was likely to be given to the manufacturers of a rather good looking but really inferior make. Our informant, then a prominent introducer of American specialties in Europe, was consulted, which resulted in his calling a cab and driving to three representative retail Hardware houses in Paris, where an Axe of this foreign exhibitor's make was purchased in each store, in each case a receipted bill being taken. Returning to the exposition, the professor in due course of time got the jury in charge of this matter together, when our enterprising friend laid one of the recently bought Axes on the floor, and with an Axe of the American make in his hand brought the tool down with all his might on the side of the other Axe, cutting into it something over $\frac{1}{4}$ inch, but little more than scarring the edge of the American Axe. When a boy our informant spent much time in the woods chopping, and was conversant with the best method of making his point. It may be added the American goods were so finely polished that

some of the jury at first mistook them for nickeled goods.

World's Fair Exhibits.

HOBART B. IVES & CO. of New Haven, Conn., exhibit in the Manufactures Building specimens of the Ives Patent Sash Locks. The display is attractively made in a large oak frame, which incloses under glass a polished board, to which are attached 46 different locks, covering all styles of finish. Four very finely finished locks, mounted on circular metal plates, ornament the corners of the frame. Eight specimens of the Ives Patent Door Bolts are shown mounted on a mahogany stand.

VAN WAGONER & WILLIAMS COMPANY, 14 Warren street, New York, and Cleveland, Ohio, have erected a pavilion in the Manufactures Building, Section P, which is of a strictly Hardware type. The roof is composed of a mammoth spring hinge, finished in imitation of bronze. It is a single-acting American hinge. The barrel forms the ridge of the roof, and the leaves or flanges form the sides. Even the screw heads are represented, so that the likeness is complete. Spindles round the upper part of the sides of the pavilion represent hinge barrels also. On the floor of the space inclosed are arranged a number of show cases containing a variety of the products manufactured by the company, such as gold-plated Spring Hinges that are used on Pullman cars or other fine work, American Gem and Oxford single and double-acting Hinges in bronze and brass and all the various finishes, Acme and showcase Spring Hinges in wrought brass, single and double-acting, from $2\frac{1}{2}$ to 5 inch sizes. Among the Hinges shown are an aluminum double-acting 12-inch American ball tip. This is only the second from the mold, but is a remarkably fine piece of work. There is also a solid bronze 12-inch Hinge, nickel plated, of the same style, which is particularly handsome. They also show Gem and Star Door Springs, a general variety of Screen Door Hinges and the well-known Gem Coat and Hat Hooks. They claim to make the largest variety of regular and special Spring Hinges in the country. A pretty mahogany upright case contains a line of American Gem, Oxford and Acme Hinges in iron, all bronze and brass plated, &c., the specimens shown being very handsome. They also show their Trenton Solid Box, Blacksmiths' and Farriers' Vises. These are so made as to render the several parts easy of adjustment and interchangeable. They are fitted with solid wrought steel screws and patented concave and convex ball-bearing washers. They also have a line of Coachmakers' and Machinists' Bench and Farmers' Oval Slide Vises. A very pretty Trinton Vise is shown, which has been filed up and polished, an ordinary Vise having been taken for this purpose just as it came from the shop to show the perfection of the forging. Doors have been hung to illustrate the operation of the Gem Trackless Parlor Door Hanger, also to show the practical application of the Gem and the American Double-Acting Spring Hinges. Full-sized heavy oak doors, fitted with beveled plate glass, have been secured for this purpose.

THE CHECK CONTROLLED LOCK COMPANY of Cleveland, Ohio, display a decided novelty in the Manufactures Building in the form of an Umbrella and Cane Lock. A pair of circular arms grasp the umbrella or cane near the top, and can only be released by dropping a peculiarly slotted metal disk in a slot at the side, which operates a catch. Pushing in a spring

causes the disk to drop out at the bottom and the device is again locked. An ornamental top prevents the umbrella from being pulled up and out of the lock. The disks being different, every owner is the custodian of his own umbrella. The lock is particularly suitable for the use of clubs, hotels or other public places.

LYNCH MFG. COMPANY of Madison, Wis., are located in the Manufactures Building and exhibit the Lynch Buckle Locks and Lock Snaps. These Locks form part of the buckle, being merely the slight enlargement of the top of the buckle frame. They are operated by a thin, flat key, which is inserted in the end of the Lock. A catch holds the tongue of the buckle in place very securely. This buckle is used in connection with a strap, as on a valise or trunk, or with a chain, as on a bicycle, boat, &c. It is also useful in locking horses when hitched. A number of sizes are shown, and the different uses are illustrated.

SNELL MFG. COMPANY, Fiskdale, Mass., are exhibiting in Section P, Block 4, of the Manufactures Building. Here they have a handsome showcase displaying their well-known line of Augers and Auger Bits, including Ship Augers, Ship Car Bits and Ship Bits, Jennings' patent Auger Bits, Gimlet Bits, &c.

SIMONDS MFG. COMPANY, Fitchburg, Mass., are exhibiting in Machinery Hall, Annex, 14, 1-35, where they have a space 23 x 19 feet. On the top of the space, 15 feet from the floor, they have a 20-foot Cross-Cut Saw, this Saw being ground after their Crescent ground method, the same method as employed by them in making all of their Cross Cuts. In the front of the space they have a counter showcase, 20 feet long, and in this they show almost every variety of Machine Knife known, among the knives being a Veneer Knife 110 inches long by 8 inches wide by $\frac{3}{8}$ thick. The company also have two upright showcases, 15 feet high from the floor, with a plate glass in each 94 x 126 inches. All of the finishings are of mahogany and they have departed from the usual custom of having black velvet for a background, having instead a mahogany plush, in keeping with the mahogany wood work of the cases. These two cases stand about 12 feet apart at the back, and then run out at an angle so as to be 18 feet apart in front. In the background, and between the back ends of the cases, they have a Circular Saw, 2 inches short of being 11 feet in diameter. This Saw is made from Jessop's steel, which was made in Sheffield, England, to fill this order, and it is said to be 3 feet larger than any Saw that has ever been made. In one of the upright cases they show various styles of Cross-Cut Saws—that is, the Saws are all Crescent ground Cross-Cut Saws—but there is no duplicate as regards the style of tooth; and in the same case they show different styles of straight Saws, such as Gang, Mill, Mulay and Drag Saws. In this case are also to be seen one-man Saws, Scroll and Jig Saws, and the McDonald Saw Set for dressing the teeth of Cross-Cut Saws. In the other upright case a 60-inch inserted point Board Saw is shown, and around this Saw are grouped Edger Saws, both of the inserted point and solid tooth pattern, a Shingle Saw, Grooving Saws of various styles of tooth, and everything in the way of a Circular Saw, this case being confined to Circular Saws and to coils of narrow Band Saws. In the background, and encircling their large Circular Saw, is a Band Saw 12 inches wide. The company invite visitors to the exposition to have their mail sent to their office and warerooms, 21 South Canal street,

Chicago, or to their space in Machinery Hall, as above.

PRATT & LETCHWORTH, Buffalo, N. Y., have their exhibit located in Section O S, Posts 1 and 2, near the center in the Transportation Building. A photograph of the exhibit shows a variety of shapes of malleable iron castings, most prominent among which are the Pooley Coupler and the O. K. Brake Adjuster. They also have many shapes of open-hearth steel castings, consisting of Propeller Wheels, Gears, Crank Shafts, Cross Heads, Pinions, Segments and many other shapes especially adapted to railroad equipment, marine, stationary and portable engines, and also to mechanical engineering and electrical purposes. These goods are appropriately arranged in the foreground of their space, near which is an assortment of Carriage Hardware, Corrugated Steel Fasteners and Steel Hub Bands. Below the cornice of shelving, further back, is shown a complete line of Buffalo Wood Hames, below which on the shelves is a large assortment of Buffalo Indestructible Toys. These consist of the latest designs and patterns and make a very attractive showing. The firm pride themselves on being one of the first in the Transportation Building whose exhibit was in proper order at the time of opening.

READING HARDWARE COMPANY, Reading, Pa., were unable to secure space sufficiently large to do justice to the goods they wished to display, and are, accordingly, unrepresented at the exposition. They call attention to the fact, however, that a fine exhibit of their manufactures can be seen at their Chicago office and warehouse, 73 Wabash avenue.

OTIS T. DANA of the Dana Hardware Company, Boston, Mass., died suddenly at Plymouth, Mass., July 7. He had been visiting the treasurer of the Plymouth Mills, and being missed during the night search was made for him, which resulted in finding Mr. Dana's body in a flume on his host's grounds. For a long time Mr. Dana had suffered acutely from insomnia and it is thought that while under the influence of this malady he wandered from the house. When found there was a slight contusion on the forehead, evidently caused by striking some hard substance. The funeral services were held at the residence of his family in South Boston, July 10, and were attended by a large number of representative business men of Boston, as well as many members of several clubs, and the Masonic Order, to which Mr. Dana belonged.

FALLS HOLLOW STAYBOLT COMPANY, Cuyahoga Falls, Ohio, issue a blotter pad, on the top of which is a printed celluloid sheet, which is sent out to the trade as a reminder that the company are desirous of securing orders for their Mandrel-rolled Hollow Staybolt Iron, which is intended for use in locomotive, marine and stationary boilers. The company state that they have increased their capacity and are now in a position to make prompt shipments.

BELLEVUE PUMP COMPANY, Bellevue, Iowa, have recently made improvements in their Pumps, and refer to the satisfaction with which they are regarded, as evidenced in the largely increased demand. In their advertisement, which appears in this issue, a full description of their Galvanized Iron Tubing and Curb for Chain Pumps will be found. Further information in regard to their line is contained in the catalogue which they issue.

Coffin and Casket Trimmings.

SARGENT & CO., New Haven, Conn., and New York, have issued a handsome catalogue, 13 x 17 inches in size, devoted exclusively to Coffin and Casket Trimmings, containing 247 pages. The work is bound in cloth, and a full-page illustration of their works at New Haven is followed by the index. Illustrations are shown of Coffin and Casket Handles, Casket Trimmings in sets, Inscriptions for Children's and Adult Plates, Ornamental Plates, German and Spanish Inscriptions, Coffin and Casket Plates with and without Inscriptions, Coffin Studs and Screw Caps, Coffin and Casket Top Lifts, Thumb Screws and Escutcheons, miscellaneous goods, Outside Box Trimmings and Handles, Undertakers' Tools, &c. The catalogue is printed and arranged in the best possible manner.

Sherman & Lyon Company.

SHERMAN & LYON COMPANY, 100 Chambers street, New York, with branches at Melbourne and Sydney, Australia, have issued a book which is devoted to the lines of goods of the manufacturers—almost 50 in number—whom they are representing as selling agents in foreign countries. Among these are such houses as the following: American Axe & Tool Company, Oliver Ames & Sons' Corporation, Plume & Atwood Mfg. Company, Washburn & Moen Mfg. Company, Atlas Tack Corporation, Bissell Carpet Sweeper Company, Geneva Tool Company, Peck, Stow & Wilcox Company, and many other leading manufacturers in their respective lines. The volume is intended to give information to foreign buyers as to the lines of goods of the different manufacturers, to each of whom a page is devoted, the opposite page being left blank for memoranda. The methods of business of the company are explained in the introduction, from which we make the following extract:

The Sherman & Lyon Company act as salesmen for American manufacturers, by whom they are paid a salary to interest colonial merchants in the several products of their different factories, and are not soliciting general indents for their own account. They are employed to exhibit samples and offer prices and information on these goods, which may be obtained by indenting through the New York export commission houses.

Our New York office is in constant communication with our manufacturers, and will forward every month to our colonial offices samples of whatever is new, and a revision of prices as often as made.

Catalogues with prices on all these lines furnished upon request from either our New York, Melbourne or Sydney offices, though, of course, we cannot guarantee prices against possible fluctuations in the market before order is received.

The line of goods which the company are thus representing comprises a well-selected variety of merchandise, such as is salable in the foreign markets which the company are canvassing, and many of the manufacturers whose

cards are given have already a well established export trade. Mr. Lyon will also represent *The Iron Age* abroad, and make arrangements for still further extending its already large export circulation.

On July 1 Polhemus Lyon sailed for England on the "Paris," and will remain in the United Kingdom about a month, and will afterward make an extended tour in the English colonies.

Manufacturing.

MORSE TWIST DRILL & MACHINE COMPANY, New Bedford, Mass., are very busy, and have recently purchased and have in use a number of new tools and machines, while they are constructing others. They will add a new brick building during the year, and will also increase their engine and boiler capacity.

THE ANNUAL MEETING of the stockholders of B. F. Avery & Sons, Louisville, Ky., was held on June 20. The business of the company for the past year is referred to as having been very satisfactory, the works continuing in full operation in every department after a shut down of only a few days for the usual annual stock taking and repairs. The following Board of Directors was unanimously chosen: George C. Avery, Samuel A. Miller, J. W. Gaulbert, Julius Bamberger and Chas. F. Huhlein. The board subsequently re-elected George C. Avery president, Samuel A. Miller, vice-president, and C. F. Huhlein, general manager.

L H MACE & Co., 111-117 East Houston St., New York, issue a card in which they state that on Thursday, May 25, they delivered to their customers 872 Refrigerators, which they refer to as their best record, exceeding their former red-letter day of Saturday, June 4, 1892, by 101 Refrigerators.

A. B. OLSON, 218 and 220 East Missouri avenue, Kansas City, Mo., advises us that he has improved his Corn Poppers so that they now have reached a high state of perfection. They are made to rest on a stand, also mounted on wheels. It is stated that the attractiveness of the Poppers is responsible for a marked increase in the business of those using them. The machines are adapted to popping corn, roasting peanuts or coffee.

THE CAPITAL MACHINE TOOL COMPANY, Weedsport, N. Y., manufacturers of the Electric Vises, are now engaged in moving their works to Auburn, N. Y.

THE GRAND CROSSING TACK COMPANY, Grand Crossing, Ill., advise us that they are running full time, and will continue to do so through the summer. They are putting in another boiler of 200 horse-power.

HAINES & ZIMMERMAN, manufacturers of Bicycle Novelties, have repaired the damages caused by their late fire, and are now in running order. They have fallen considerably behind-hand with their orders, but hope to catch up with them in a week or two.

SINGER, NIMICK & Co., Pittsburgh, Pa., represented by Hogan & Son, 243 Pearl street, New York, are manufacturing Steels especially for Bicycle purposes. Among these are bright cold rolled Steel for rims and mud guards; special quality Singer's extra (mill tempered and annealed) for cones, bearings, &c., to be hardened in oil; fine crucible and O. H. spring Steel for saddles; special quality Steel for forging purposes, &c., and Steel for coasters, seat posts and other purposes.

Detailed Reports

As to the Condition of Trade Throughout the Country.

IN ORDER TO GIVE full and accurate information in regard to the feeling among the trade in the different parts of the country, we print below extracts from advices which we have received from representative Hardware merchants in the various States, who are in a position to reflect correctly the feeling in their different localities. It will be observed that while many of them refer to the difficulty of making collections, business during the past few months is frequently referred to as having been in good volume; while others, in alluding to the dullness which prevails at the present time, express the hope of an early revival, and some of them of a large trade in the fall. Our correspondents, we may add, are most of them representative retail merchants, but some of them are well-known jobbing houses. While some of these reports are more or less local in their character, and are to some extent colored by the individual views of the writers, taken all in all they undoubtedly reflect the condition of feeling among the trade at large.

CONNECTICUT.

We have had the best business for the past year that we have ever had, and sales and collections have been way beyond our expectations. Conversing with our bankers I find that our merchants as a rule have had good bank accounts all summer. What is in store for us we cannot of course say, but if the agitation would only stop now business would go on and none of us would know that anything had happened. We have some customers who use the present condition of things as an excuse, but they are the ones who always have some excuse for putting off pay-day. I may be entirely wrong, but I feel that great help to restoring confidence in the country would come if newspapers would begin and talk the bright side. We hear in the papers all about bank failures, &c., all over the West, but we hear nothing about the solid, conservative, steady-going Eastern and New England bankers, who are paying all claims and are as solid as the granite hills. Let us hear the bright side.

KENTUCKY.

Our business from January 1 to July 1, 1893, is about equal to the business of the same period last year. The trade in the city has been slightly better. For May and June, 1893, the trade shows a falling off. Margins are not so good owing to the pressure and the cutting of prices by large jobbers to unload, and also on account of the present financial squall. Collections have been difficult to make in some quarters, owing as much to apprehension of the future as to want of funds to liquidate. Many are holding on to money that they would pay out if business and finances were in their normal condition. Banks are calling loans whenever it is possible to do so, and are refusing to make any new loans, prefer-

ring to hold on to money for fear of greater strain on them. This makes the public very apprehensive. Statement-day has come and gone, and we think the greatest troubles over, and as soon as the banks get confidence the people will fall into line. There is really no reason, but the financial one, why trade should not be better than in 1892.

OHIO.

The farmers are very much disturbed by the low prices of wool and wheat, and are inclined to be conservative in buying. The World's Fair will take a good deal of our loose money, with no prospect of its coming back here to circulate again. The banks are not lending any money, except to those who can give "gilt edge" security; and that class do not want to borrow. A manufacturer told us the other day that collections were slower than they had been for years; that men who were rated way up, even as high as a million, were not meeting their obligations promptly. The consolation in all this is that the crops around here look well and bid fair to be above the average. We think it wise to keep close to shore just at this time. Trade is fair and up to the average, but we have some that complain.

GEORGIA.

The trade of southeastern Georgia is at a complete standstill. The products of this section—namely, lumber, naval stores, cotton, rice, &c., are away down in price, with no buyers. These items in the past have always commanded good prices. Now they are not moving except at a loss. We believe that most of our people are several times solvent, based on conditions existing a year ago.

NEBRASKA.

Money has been very close in this section for a few months back, but is a little easier at present. The outlook is good for a big trade this fall as there is excellent prospect of a good crop.

DELAWARE.

All trades are complaining of the depression in business. In the large manufactories they are laying off hands or quitting for a time. Comparatively few new buildings are being estimated for. There is a heavy falling off in bank deposits and comparatively no discounting. Collections cannot be made.

MISSOURI.

We are agricultural people here rather than manufacturers, and, excepting wheat, we have had poor crops the last two years. Hence we do not notice the present money disturbance here so much as in manufacturing places. At the same time all our industries are suffering, more or less. What little capital there is here seems to be tied up in the banks. Collections are poor, and the laboring classes are idle to a great extent. We hope when Congress meets it will give relief, that is, restore confidence.

TEXAS.

Texas, owing to good crops and fair price for cotton in 1892, entered the present year in splendid condition. Our State Legislature passed no laws antagonistic to capital, and the State is undergoing reasonable growth and development. My sales for the first six months of 1893 exceed those for the same period in 1892 by 18½ per cent., and those for 1891 by 10¼ per cent. The financial disturbances, however, of the last two months, and the uncertainty as to what the near future may bring, strongly admonish our merchants to conservatism. Our banks, feeling compelled to maintain a strong

position, and being practically cut off from rediscounting paper at the money centers, are unable to accommodate merchants to the usual extent until the crop is harvested and collections made. This, of course, directly reacts upon the jobber by diminishing his ability to distribute goods to the retailer on "time until fall." Crops of corn and cotton promise an abundant yield, and with the restoration of confidence in our currency, the only element that seems to be lacking, our trade will be in healthy condition.

MINNESOTA.

The financial stringency which is caused by the feeling of doubt and uncertainty which exist throughout the country, while perhaps not as noticeable here as in large cities, is, however, keenly felt. Money loaners are calling in their loans where they can. Banks, while taking good care of their customers, are refusing outside loans. Manufacturers and jobbers are urging collections. The farmers' resources are limited by reason of the existing low prices of farm produce; hence the merchant is forced to realize on his stock of goods and resorts to cutting prices below a living profit. However, every cloud has a silver lining, and a better feeling already exists. Should Congress repeal the silver bill and take wise conservative action regarding other important questions, confidence would again be restored; money again would be put into circulation that is now hoarded and trade assume its normal condition.

NORTH CAROLINA.

Our trade until within the last 30 days has been unusually heavy. We consider the uncertainty of what will be the final outcome of the present financial conditions to be one of the main causes of the present stagnation of business, although in our section the general condition is better than it has been for several years. We therefore look for brighter times in the near future and anticipate a good fall business. Speculation is the curse of this country and we consider it the sole cause of the present financial condition of the country, for the South, financially, is in as good condition, if not better, than it ever has been.

SOUTH DAKOTA.

Trade is very quiet, fully 30 per cent. less than it was last year to this date. Our banks have made no new loans for two months, and are calling in all loans they can possibly get paid at maturity. They have, however, accommodated their own customers whom they knew to be good. It cannot help causing trouble if the stringency and unrest continues.

RHODE ISLAND.

Business for '93 appears to be up to the average; building, by the citizens, being about as usual. Contracts for two large summer villas have been awarded to Boston contractors. The city is building a new industrial school, and with some 25 or 30 cottages, ranging from \$3000 to \$5000, which are going up, it makes a fair outlook for the Hardware trade until fall. Crops are good, prices fair, hay harvest extra heavy, but poor weather up to date to cure it. The potato crop is about 20 per cent. lost from the early wet and late spring, but the balance of crops never looked better and Boston buyers claim that prices will be better than in former years; these crops pay the farmers cash by July 20 and ease local dealers who carry them. Money is tight, collections are very slow, but my trade is the best that I have ever had, owing largely to my better facilities for doing business and displaying goods.

WEST VIRGINIA.

Trade generally through this section is not as brisk as it should be at this time. The only reason we can give is the present existing financial scare, which makes collections very hard and money generally scarce. Our crops are fairly good, and trade should brighten up as soon as some of the wheat can be put on the market.

VERMONT.

Although there have as yet been few failures, still the feeling is that of great uneasiness. Our banks are not discounting any new paper, and are not renewing old except for their best customers. It seems to be the general opinion in this section that there will be no favorable change till Congress manages to get a few common-sense notions and repeals the Sherman act.

NEW JERSEY.

My spring business was fair, but now it is quiet and not so good as in other years. Collections for the months of May and June were good—fully as good as usual, but since April 1 there have been four failures in the building trade and the outlook for new business is not bright.

NEW HAMPSHIRE.

This immediate vicinity does not seem to be affected by the financial disquietude, as we are largely dependent upon summer guests for business, and the owners of beach houses are obliged to get them ready for occupancy about July 1. This makes it very busy for us.

MASSACHUSETTS.

The volume of business has been fairly up to last year's until within the last two weeks. Collections have been very slow, and everybody seems too poor to do anything but sign a note. The tide of summer vacationists is setting this way, and the cash they leave and the July dividends will, we think, ease up the present stringency somewhat.

MAINE.

Trade has been very good in this vicinity during the spring and summer, and as yet is very little affected by the financial situation, though we may feel it later in the season. There are several local reasons why we do not feel the pressure as much as in larger places. Last year the hay and potato crops were very good here, the farmers receiving good prices in cash for the same, so that they have the means to fix up their buildings and improve their farms. Think trade and collections are fully as good as usual at this season of the year.

IOWA.

Trade in Northeastern Iowa may be sized up as fair. Heavy Hardware, which enters into buildings, is in good demand, also house furnishing and Wire goods of all varieties. Farming implements are in demand for haying. Sixty-day bills are maturing rapidly, and invariably notice is served by creditors that unless remitted in a few days they will draw at sight. Banks are unwilling to accommodate for fear of a run, and hoard up their currency to meet any emergency that may arise.

The outlook for Iowa with her bountiful crops this year is encouraging. Everywhere in my section as far as the eye can reach is a beautiful stand of corn. The barnyards are full of cattle and hogs, and a fine stand of small grain and a heavy crop of hay are already assured. If the elements do not destroy us the financial problem will soon be settled in this section, and obligations will be liquidated promptly. All that is wanted is confidence.

SOUTH CAROLINA.

The tightness of the money market for the last two months has had a depressing effect upon all branches of trade here. Up to 60 days ago our people were very hopeful and were buying liberally. Now, they are economizing, alarmed and buying little beyond the necessities of life. Our farmers, upon whom our trade mainly depends, usually rely upon the local banks here for money at this season of the year; now they cannot get a cent in this way and the merchants feel the scarcity of cash. We think this condition of affairs is general throughout the South. With good crops and fair prices better times are confidently expected in the fall. The farmers are economizing and the merchants should be forewarned, that no disasters may follow.

ILLINOIS.

Trade in this section is exceptionally quiet at present, but more owing to shortage in crops and the extreme low prices that they are selling for than to the financial disquietude. Ours is exclusively an agricultural section and the farmers are now in the middle of wheat harvest, which is only fair this year, and bids fair to bring but little after harvested.

IDAHO.

The present low price in silver has caused untold hardship in this part of the country. Mines here are nearly all silver producers. With no market for the same, Hardware and other lines are virtually at a standstill, and if this condition of affairs continues long it will result most seriously to this Western country. Rates of interest are very high on old loans, and new loans cannot be had under any conditions. Grasshoppers and crickets have done untold damage to the farmers and there is no sunshine in the business prospect here for the present.

MISSISSIPPI.

The fact that our last year's crop was small, and following, as it did, a very heavy crop, with low price in proportion, had its effect on trade before the present general stringency of the money market set in, but now that farmers cannot get money they are buying less than in years, and will raise the present crop proportionately cheaper; but with a continuation of the favorable weather that has existed here thus far, there should be better trade when the crop is harvested, late in the fall. This has been a strong free-silver section, but the drop in the price of that article has made our best financiers believe that, after all, probably the people who handle the money for the nation know their business better than the theorists on the silver side of the question. We are looking anxiously to the action of Congress. Our banks are considered in good condition to weather the storm, and are very conservative in their dealings.

MARYLAND.

The stringency or distrust in financial matters is first felt in the cities. We in this section do not have to wait to be told of the existence of the state of disquietude of finances in the cities, as we tangibly feel its baneful effects in the prices our truckers receive for their fruits and vegetables shipped to the cities, or money centers. Under the existing state of finances the prices realized by our truckers are very unremunerative. On the other hand, when good prices are realized by our wood-working factories, farmers and the oyster industries, monetary matters are easy in the cities, confidence restored and money seeking invest-

ment, the laboring man on full time, money freely circulating, everybody busy.

COLORADO.

Leadville and the surrounding country is entirely dependent upon silver and lead mining for support, and the present price of silver and lead has caused a universal closing down of the mines. I should judge that from 2500 to 3000 men have been discharged in the last three days, in the Leadville district, and there are not more than 500 men now at work, and a portion of these will be let out this week. The smelters, who employ about 1000 men, will close as soon as their stocks of ore are smelted, and after that occurs the prospect for the camp will be a very gloomy one, unless silver and lead should rise rapidly. The general financial disquietude did not affect us here—but we cannot produce either silver or lead at the present prices—so that trade is almost nil.

FLORIDA.

The volume of business this year is about as usual at this season, which is always a dull one in Florida. Collections are very difficult, as all the local banks have followed the example set by their Northern contemporaries in refusing to renew loans or make discounts. The failure of the tomato crop in South Florida has also caused severe losses, and many merchants will have to carry accounts over until next season. Building still continues good, however, and several fine stores and residences are now being erected in our vicinity by Northern capital. Conservative merchants do not fear any disastrous results from the financial panic in Florida, except in a general way, as it affects the whole country. The Hardware trade is apparently as solid and as safe as ever.

WYOMING.

The general condition of trade in this section is very unsatisfactory, and the future outlook by no means encouraging. Collections are very slow; no building is being done; no new enterprises being undertaken. We attribute this condition primarily to the depreciation of silver. Our next most important industry is wool, the market for which is demoralized. In anticipation of "free wool," prices are about 40 per cent. less than last year and buyers scarce. We feel it the duty of Congress to speedily determine what the financial policy of the Government shall be, as we can more readily adapt ourselves to pernicious or hostile legislation than we can to the condition of doubt and apprehension now existing.

DISTRICT OF COLUMBIA.

The financial troubles of the country have not affected the Hardware trade in and about Washington beyond a curtailment of sales and a tendency to slow collections. Lack of speculative money has retarded suburban improvements and checked building of new suburban railroads and extensions of existing lines to a certain extent. The aggregate value of houses being built in the city proper, for which permits have been issued, is beyond that of any previous year, but the number is less than usual, showing that the buildings under construction are of the better class and will, naturally, demand a better class of Hardware. There have been no failures and no financial embarrassments among the Hardware trade here and I do not think there will be, for, generally speaking, they are in good sound condition. One or two builders have been in financial trouble, but they were small people who ran only small accounts, so that the loss, if any, to the Hardware people will be light from

that cause. The general feeling is that trade will be rather light for the rest of the year; that stocks must be kept down and credits carefully scrutinized.

WISCONSIN.

Were it not for a good farming community about us business would be flat indeed. Our mills are beginning to shut down or decrease their output. Confidence is badly shattered. Our banks are hardly taking care of their best customers. Harvest prospects are favorable, but prices are low. Trade is fair but collections bad.

NORTH DAKOTA.

Business generally in this section has been extremely dull for a long time, accountable principally to the low price of wheat (40 cents per bushel for No. 1 at present; has been down to 35 cents), and the difficulty to raise loans, the banks running very close. Then wool is down to 9 cents, which scarcely pays for raising. Therefore I have had to carry many farmers from the spring of '92, and must trust in Providence and this year's crop to get anything from them. Of course, if money were easier at the banks our merchants would get through gracefully enough.

MONTANA.

Trade in this section is very quiet at present and most of our silver mines and reduction works are closed. If relief does not come soon in the advancement of silver the West, and particularly Montana, will suffer greatly.

MICHIGAN.

We are pleased to report quite a marked improvement in the condition of trade, which has been developing since the dawn of 1893, and despite the present general existing conditions there has been a steady increase in the volume of business, which has kept up right along in the face of financial distrust. While in some particular lines of trade there may be some complaint of expectations not realized, we have reason for believing that the trade of this section is in a sound and healthy condition. We depend chiefly upon the farmers, who are getting well on their feet again after passing through the changing conditions from lumbering to agricultural development. The growing crops in our section are in excellent condition and promise good returns.

Clothes Wringers.

LOVELL MFG. COMPANY, Erie, Pa., have issued a complete illustrated catalogue and price-list of goods manufactured by them, including Clothes Wringers and Hardware and household specialties. They state that new departments have been recently added, and that their manufacturing facilities have been greatly increased. Their line of Wringers, which has recently been greatly enlarged, covers a complete variety of styles, from the highest to the lowest in price. Especial attention is called by the makers to the Geneva Wringer, with purchase gear, both tub and bench; to the Rockford and Brighton, both tub Wringers, and also to the Swan, an iron-frame Wringer, with steel spring and regular swing clamps. The Hartford Bench Wringer, with folding bench, similar to the Gem, will not be ready for delivery until after August 10, 1893. **W. H. Quinn & Co.** carry stock for the New York trade at

103 Chambers street. For description and prices of Wringers see Notes on Prices in this issue.

Trade Items.

IT IS A FAMILIAR FACT that Norway Iron is gradually disappearing from uses to which it has been put, as goods which were formerly made principally or exclusively of such Iron are now in many cases being made of other Iron or Steel. This is understood to be the case with Rivets, as they are in some cases made from inferior material costing from $\frac{1}{2}$ cent to 1 cent a pound less than genuine Norway Iron, while they are still referred to as made from Norway Iron, or of material as good. In this connection it will be observed that some of the manufacturers, besides their regular line of Norway Rivets, are putting on the market a line of cheaper Rivets, which are not made of Norway Iron.

THE NUBIAN IRON ENAMEL COMPANY of Cragin, Ill., have come to the front with a daily memorandum desk calendar for the third quarter of the year, each day being embellished with quaint sayings, bits of wisdom and breezy references to Bonnell's Nubian. From an introductory note to the package of memorandum sheets it is inferred that Manager Bonnell was caught in some of the bank failures in Chicago. It is bad enough to have a fire, but to be burned out and to be financially fore-shortened in the same year is altogether too unpleasant. Nothing can undaunt his spirits, however, and he carols as merrily from day to day as if there was no such thing as a fire and he had never heard of a bank.

A. L. BABCOCK HARDWARE COMPANY, Billings, Mont., owing to the increasing business at their main store, are desirous of selling one of their branch stores, which has been established six years. The matter is referred to in one of the special notices in this issue, in which allusion is made to the stock, location, &c.

THE CHICAGO FOUNDRY SUPPLY COMPANY, whose Peerless Facing Mills are at Eighteenth and Rockwell streets, Chicago, have opened an office at 503 Teutonic Building, southeast corner of Washington street and Fifth avenue, in that city. They invite visiting foundrymen to call upon them at this central location, where every facility will be provided for attention to needed correspondence. The favor will doubtless be acceptable to many of those who are now making the pilgrimage to the World's Fair.

W. W. PRYOR & Co., 81 Chambers street, New York, have been appointed Eastern agents by the Unity Door Check Company, Chicago, for the sale of their Door Checks. A full line of samples of the checks will be carried. **W. W. Pryor & Co.** have also been appointed sole agents for the sale of the Gimlets, Punches, Counter Sinks and Ice Tools manufactured by **H. M. Norton & Co.**, Chester, Conn. A full line of samples of these goods can be seen at their office.

THE LOUIS HOFFMAN HARDWARE COMPANY, Vicksburg, Miss., held their seventh annual meeting on July 3, at which a dividend was declared and the old officers re-elected, including Louis Hoffman as president.

L. SCHUTTE of L. Schutte & Co., Philadelphia, is again confined to his house through illness, but is improving and may possibly be able to resume his position at the head of the business in about a week.

ANDREW WHEELER, JR., of Philadelphia, sailed for Europe on Saturday last for a brief visit and expects to return early in the fall.

THE SHEPARD HARDWARE COMPANY, with temporary offices at 67 and 69 Forest avenue, Buffalo, N. Y., issue a circular to the trade respecting the interference with their business caused by the destruction of their works by fire. The circular is headed with a half-tone engraving of the ruins of their factory, and below is the line "The above cut explains why we cannot execute orders promptly." They say in their circular that they are declining orders owing to the destruction of their works and office, their stock not only being burned but also the machinery, patterns, follow boards, &c. Still they hope to make shipments before November or December next. Their pattern makers are now at work, so that their customers can rely on getting Lightning Ice Cream Freezers and other goods of their manufacture for the spring season of 1894. They add that they have no repairs for Freezers on hand, but they hope within the course of a few months to be able to furnish them. The Shepard Hardware Company have not yet decided when and where they will rebuild, but will advise the trade as soon as possible.

Price-Lists, Circulars, &c.

TOLEDO WHEELBARROW WORKS, G. W. Thomas & Co., proprietors, Toledo, Ohio: Wheelbarrows. An illustrated catalogue shows Jointless Bent Leg Garden Barrows in various styles—Straight Leg, Straight Leg Braced, Improved No. 1, Sand and Mortar Barrows, Steel Tray, Wood and Bark, Stone and Sawdust Barrows. Attention is directed to their Steel and Iron Barrow Wheels.

WHITE MFG. COMPANY, Minneapolis, Minn.: Woven Wire Mats. These are made in Door, Elevator, and Long Mats of Galvanized Steel Wire. It is stated that the wires are woven bracing each other and cannot flatten or get out of shape; also, that the border is heavy and strong, with metal corners. Attention is called to the fact that the Mat can be used either side or either way, and that white porcelain letters can be inserted after the Mat is finished, the letters in no wise interfering with the Mat.

It Is Reported—

That **J. H. Chase** has enlarged his Hardware store at Lewiston, Me.

That **P. J. Jacobs**, a young Hardware merchant of Steven's Point, Wis., was married to Miss Josephine Krembs on the 27th ult.

That **John Kammerer's** Hardware store at Gowanda, N. Y., was badly damaged by fire on the 1st inst.

That the Hardware store of **H. Moffett & Co.**, Visalia, Cal., was slightly damaged by fire on the 26th ult.

That the Gun store of **J. F. Schmelzer & Son**, Leavenworth, Kan., was burglarized on the 2d inst. The booty secured was of little value.

That the Hardware store of **W. E. G. Leoffler**, Stockholm, Wis., was broken into by burglars on the 30th ult., and \$200 worth of Guns, Knives, &c., stolen.

That the Hardware firm of **Rivers & Bell**, Troy, N. Y., has been dissolved by mutual consent, Mr. Bell withdrawing from the firm.

That the Red Wing Hardware Company, St. Paul, Minn., have filed amended articles of incorporation increasing their capital stock from \$100,000 to \$250,000.

That Field & Coffeen, Alma City, Minn., dealers in Hardware, have dissolved partnership.

That McGowan Bros. & Co., dealers in Hardware, Davenport, Wash., were recently damaged by fire.

That J. R. Muir, dealer in Hardware, Implements, &c., Verona, Wis., has disposed of his business to N. Lindsay.

That Spaulding & Hought, dealers in Hardware, Guns, Implements, &c., Renville, Minn., have been succeeded by Hought & Peterson.

That W. H. Clark, Hardware merchant, Tracy, Minn., has been succeeded by A. F. Kluge & Co.

Paints and Colors.

It should be understood that the prices quoted in this column are strictly those current in the wholesale market, and that higher prices are paid for retail lots. The quality of goods frequently necessitates a considerable range of prices.

There is really no change in the general condition of the market, and none in the surroundings that would tend to invigorate business. In price of Pig Lead there has been a reaction of about $\frac{1}{8}\phi$ per pound from the late extreme lowest point, and to that extent a threatened disturbing factor has been removed, temporarily at least. In other base materials and stock used by grinders the movements have been strictly commonplace and without visible effect upon values of manufactured goods. Regarding business there is little to say except that nearly all lines of Paints and Colors, like other merchandise, have been rather difficult of sale owing to the stringency of money, and that business makes hardly a creditable exhibit for this season of the year. Slow trade has prompted extra effort on the part of salesmen, and thereby caused some irregularity in actual selling prices for a few lines of goods, but the movement seems to have been within narrow limits and no greater than usual at this season of the year.

White Lead.—Orders have been coming in rather slowly and almost wholly for small quantities. This remark applies alike to corrodors' product and the cheaper class of pigment, and the presumption is warranted that general distribution is hardly up to the average for the midsummer season. The little irregularities in prices that have prevailed for some time past continue, but no fresh breaks appear to have been made during the week, and competition is, if anything, rather more temperate than it was some little time ago. The fact remains, however, that pure carbonate can be secured in small quantities, from second hands, at prices very close to the minimum card rate for large lots.

Red Lead and Litharge.—With glass factories and rubber manufacturers doing very little work at present, the outlet is narrow and sales of other than moderate quantities to smaller consumers and jobbers are strictly the exception. On low grade product prices are, therefore, rather weak, but the better varieties used by the Paint trade command the old line of prices, since there is no pressure to sell.

Litharge.—Business has been slow and the demand at present is moderate, but in the absence of anything more than ordinary selling pressure prices hold their own in very good shape.

Zincs.—Orders for domestic product have been uniformly light and deliveries on old contracts have not been

entirely satisfactory to producers, inasmuch as some buyers have requested partial suspension of shipments for the time being. This tends to soften the market a trifle, but no radical change in prices is quoted. Foreign is without positive change in price, but selling slowly.

Colors, &c.—No new feature has developed in the market for Dry Colors. Demand has continued slow and the business effected was at practically former prices. Oil Colors have fared about the same and on ready-mixed Paints there is nothing to note except the usual summer trade has been experienced, with the former line of prices the rule.

Oils and Turpentine.

Trade in all lines of animal and vegetable Oils has continued slow and the markets are bare of feature calculated to enliven buying interest in the slightest degree. For that matter the general surroundings tend to restrain trade purchases and act as an effectual damper upon any ventures in the speculative direction. Here and there some weakness such as usually appears in a dull market has figured in a moderate way, but the week's doings show nothing in the nature of radical fluctuation.

Linseed Oil.—City crushers have been dealing out small quantities of Oil to about the usual extent for this season of the year, and handlers of outside product have experienced none but a very tame demand. Some of the latter still sell at as low as 48¢, but no lower rate seems to be made, and as the competition is not vigorous, city brands are held at 50¢ for Raw Oil, with the regulation difference for Boiled. There is no decided change in the market for raw material.

Cotton Seed Oils.—A fair volume of business has been effected, but the net result is a slight gain for buyers as far as prices are concerned. This is due in a measure to anxiety on the part of some receivers who were not in a position to carry stock, but the fact that demand is hardly up to the average had a certain amount of depressing influence. Latest dealings were at 36¢ @ 37¢ for Prime Crude, 41¢ @ 42¢ for Prime Summer Yellow, and corresponding prices for other varieties.

Lard Oil.—The market for this commodity has been a rather poor one, and prices are weak on the basis of 72¢ @ 73¢ for prime city pressed Oil. Jobbers and consumers buy small quantities only, export call is light also and near future deliveries at prices slightly below those current for spot seem to possess no attraction whatever despite somewhat higher average cost of raw material.

Fish Oils.—There has been no movement in crude Sperm or Whale Oils, but the market remains firm, stocks being moderate and very closely controlled. The manufactured products are moving fairly in small quantities at old prices. Reports as to the Menhaden fishing have not improved, and holders of Oil therefore still place a high value upon their goods that precludes business for the time being. Cod Oil has undergone no change.

Miscellaneous.—Common Olive Oil, in barrels, has been selling rather more freely, but prices continue low and rather irregular for both spot stock and future shipments. Coconut Oils have been slow of sale and remain almost stationary in price. Red Oils are unchanged.

Spirits Turpentine.—Slow sales and fairly free offering have combined to weaken prices somewhat and the market at present is soft. Regular barrels could have been purchased at 28½¢ and machine barrels at 29¢, in wholesale quantities.

CONTENTS.

	PAGE.
The Crafts Radial Drill. Illustrated.....	49
The Foundrymen's Association.....	50
A Pneumatic Traveling Shop Crane	52
The Bliss Double Crank Press. Illus.....	53
The Adoption of Water-Tube Boilers for the New British Torpedo Vessel "Speedy".....	53
The Engineering Congress.....	54
A New Form of Lightning Rod.....	54
An Important Chicago Failure.....	54
The Storar Packingless Valve. Illus.....	55
Naval Ships and Guns Abroad	55
Western Foundrymen's Association.....	56
Cornering or Rounding Machine. Illus.	58
Fire-Box Steel.....	58
Mesaba News.....	59
A Test of Carpenter Shells.....	59
The Kennedy Fire Hydrant. Illus.....	59
The Bethlehem Hammer. Illustrated....	60
The Week	63
Editorials:	
The World's Fair.....	64
The Economy of Special Tools.....	64
Popular Disinclination for Manual Training.....	64
Correspondence.....	65
Personal	65
A Heavy Decline in Pig Production.....	66
The Western Iron Scale.....	67
The Minnesota Iron Company.....	67
Manufacturing:	
Iron and Steel.....	68
Machinery.....	68
Miscellaneous.....	69
Trade Publications.....	69
Trade Report:	
Chicago.....	70
St. Louis.....	71
Louisville.....	71
Cincinnati.....	71
Philadelphia.....	71
Boston.....	72
Pittsburgh.....	73
Cleveland.....	74
Financial.....	74
Coal Market	74
Metal Market.....	75
New York.....	75
British Iron and Metal Markets.....	76
Hardware:	
Condition of Trade.....	77
Notes on Prices	77
Export Notes.....	79
Local Checks.....	79
How a Medal Was Won	80
World's Fair Exhibits.....	80
Coffin and Casket Trimmings.....	81
Sherman & Lyon Company.....	81
Manufacturing.....	81
Detailed Report as to the Condition of Trade Throughout the Country.....	82
Clothes Wringers.....	84
Trade Items.....	84
Price-Lists, Circulars, &c.....	84
It Is Reported —.....	84
Paints and Colors.....	85
Screen Wire Cloth Measuring, Winding and Cutting Machine. Illustrated....	86
Banner Bolt Snap. Illustrated.....	86
Winchester Repeating Shot Gun, Model 1893. Illustrated.....	87
Adjustable Web Halter. Illustrated....	87
Odorless Stew and Fry Pan. Illus....	87
Lafaver Automatic Ejector Gun. Illus.	88
Plain All-Steel Pulley. Illustrated....	88
Current Hardware Prices.....	89
Current Metal Prices.....	96

Screen Wire Cloth Measuring, Winding and Cutting Machine.

The accompanying cuts represent an improved wire screen machine being introduced by O. P. Schriver & Co.,

until the measuring dials indicate that the required amount of cloth has been measured off. The measuring arrangement is then turned back and the cutting bar folded over, as in Fig. 2, and the knife is inserted to cut the cloth. The measured roll is then tied with

Conn., was entirely destroyed by fire on June 25, together with some of their other buildings, but their office and made-up stock of goods were saved, as well as some of the most important departments of their plant. Fortunately the company had plans all drawn for new factories, the erection

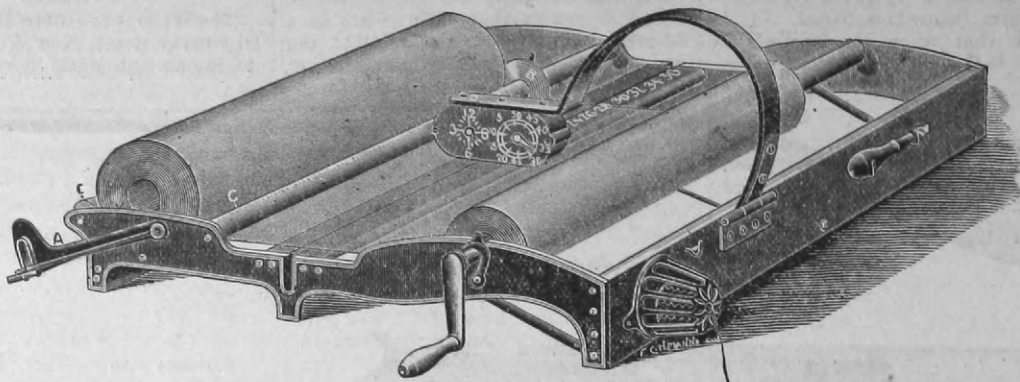


Fig. 1.—Screen Wire Cloth Measuring, Winding and Cutting Machine.

Pearl and Sycamore streets, Cincinnati, Ohio. The I X L wire cloth machine consists of a frame, as shown in Fig. 1,

strings, the split roll withdrawn, as in Fig. 3, and the cloth is ready for the customer. The advantages claimed for

of which will be commenced at once. Their foundry will be ready in the course of two months, but the manu-

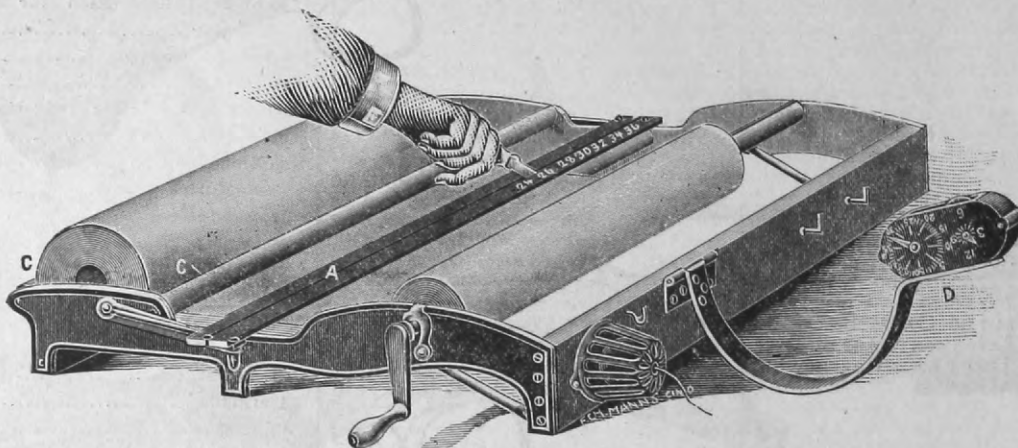


Fig. 2.—Cloth Measured Ready for Cutting.

in which the rolls C C revolve. The washer B on the front roll is movable, and prevents the cloth from running

the machine by the manufacturers are: That it requires but two minutes to roll and measure 100 feet of wire cloth of

facture of their other lines of goods will be resumed in a few days. The new factories will not be built on the old site, but a short distance below it, on the line of the railroad, where they will have better facilities than heretofore. The company advise us that they will be able to take care of all their business, with the exception of iron castings, by July 15.

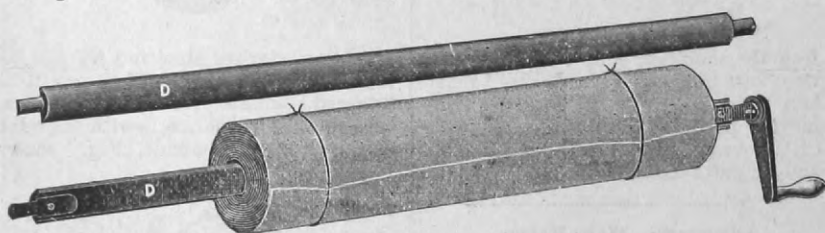


Fig. 3.—Split Bar Roller.

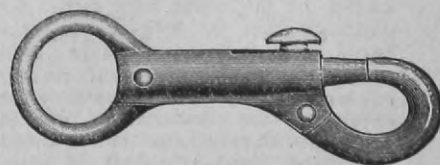
sideways. The cutting bar A throws back out of the way while the cloth is being measured, the bar having a slot corresponding to a slot in the frame, in both of which the knife runs in cutting, to insure a straight cut. The figures on the cutting bar designate the width of the cloth in the machine, to avoid mistakes being made by cutting cloth of the wrong width. The measuring arrangement has two dials, one indicating inches and the other feet. In use the roll of screen wire is placed in position, and the washer B fastened at the proper place on the front roll. The cloth is pulled from the revolving rolls to the slot in the center of the machine and the measuring dials folded over, as in Fig. 1, to the edge of the cloth. The cloth is then drawn to the center of the split roll, shown in Fig. 3, and the roll turned

any width up to 36 inches inclusive; that it measures and winds every roll compact, as small as when received from the factory, at one operation; that it does not kink, dirty or bruise the wire while measuring and cutting; that it is impossible to cut crooked, or to make a mistake in the width of the cloth to be cut, as the dials indicate the precise amount turned upon the roll, and that the machine requires but 24 inches counter space. The point is made that the machine saves time, is a novelty to customers and an ornament to a store. This machine is designed to be used with the wire rack made by the same firm and illustrated in *The Iron Age* of June 8, 1893.

THE IRON FOUNDRY of the Turner & Seymour Mfg. Company, Torrington,

Banner Bolt Snap.

The accompanying cut represents a snap put upon the market by Covert's Saddlery Works, Farmer, N. Y. The snap is only made with covered spring, which, it is remarked, overcomes ob-



Banner Bolt Snap.

jections to a bolt snap where the spring is not covered, and thus protected from foreign substances and freezing. The manufacturers claim that the snap is light, neat and low in price.

Winchester Repeating Shot Gun, Model 1893.

Winchester Repeating Arms Company, New Haven, Conn., and 312 Broadway, New York, are putting this article on the market, as illustrated herewith. The arm is operated by a sliding fore-arm below the barrel. It is explained that when the hammer is down the backward and forward mo-

desired; but unless otherwise ordered, guns with 30-inch barrels will in all cases be sent. The manufacturers state that, with their regular trap cartridge, containing $3\frac{1}{4}$ drams F. F. G. powder, one card and two black edge wads on powder, $1\frac{1}{4}$ ounce No. 8 shot and one card wad on shot, the guns will be found to pattern above 325 pellets in a 30-inch ring at 40 yards; and that the gun is safe, quick, easy of manipulation

adjustment to any size head, combined with the principle of their Handy Web Halter. The moderate price at which it can be sold is referred to by the manufacturers.

Odorless Stew and Fry Pan.

The Wilmot & Hobbs Mfg. Company, 20 Murray street, New York, are introducing an automatic cover-raising and

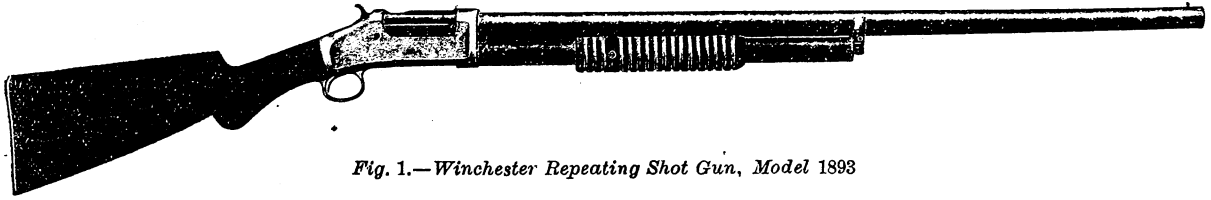


Fig. 1.—Winchester Repeating Shot Gun, Model 1893

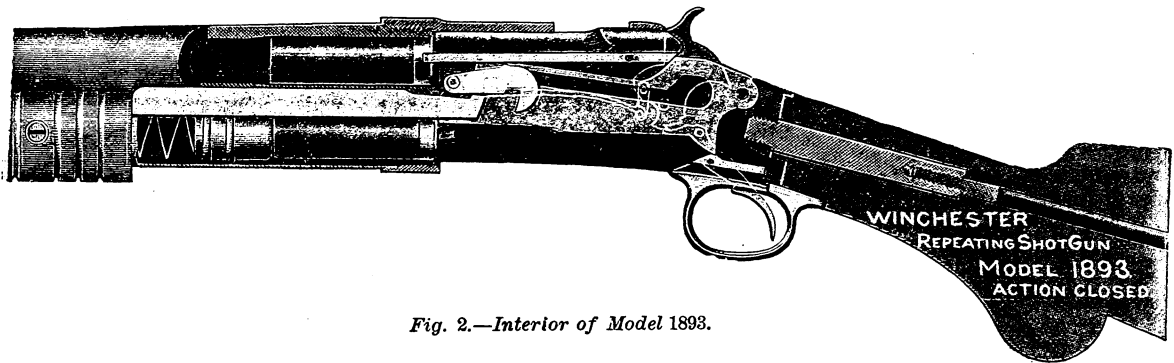


Fig. 2.—Interior of Model 1893.

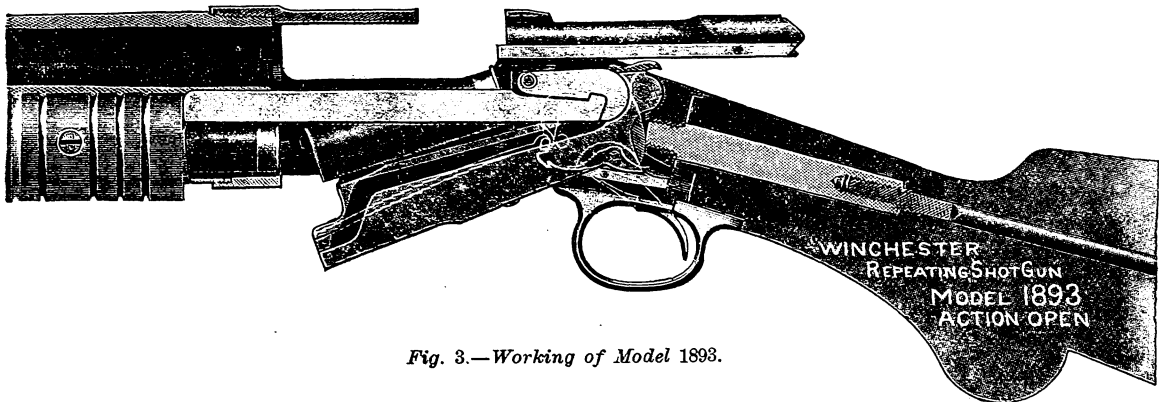


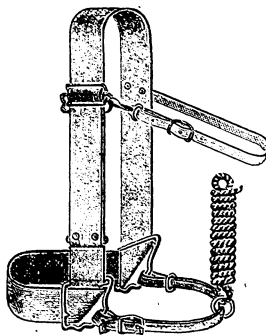
Fig. 3.—Working of Model 1893.

tion of this slide unlocks and opens the breech block, ejects the cartridge or fired shell and replaces it with a fresh cartridge. The construction of the arm is such, it is stated, that the hammer cannot fall or the firing pin strike the cartridge until the breech block is in place and locked fast; also that while the hammer stands at the full cock notch the gun is locked against opening. The point is made that in this position the firing pin must be pushed forward to open the gun; and when the hammer stands at half cock the gun is locked both against opening and pulling the trigger. The backward and forward motion of the action slide carries the cartridge from the magazine into the barrel. The magazine will hold 5 cartridges, which, with the one in the barrel, make six at the command of the shooter. The standard gun will be made up with rolled steel barrel, blued frame and pistol grip stock of plain wood, not checked. All guns will be full choked, and no gun, it is stated, will be sent out which will not make a good target. Three-blade or four-blade Damascus barrels will be furnished when desired. The gun can be furnished in 12-gauge only; weighing about 7½ pounds. The standard length of barrel will be 30 or 32 inches, as may be

from the shoulder, simple in construction, sure in operation and easy to load and unload. It is claimed that the moving parts are few and strong, made of the best material, all being forged, and all parts interchangeable.

Adjustable Web Halter.

The accompanying cut represents an adjustable web halter, brought out by



Adjustable Web Halter.

Covert's Saddlery Works, Farmer, N. Y. The principal point of superiority of the halter, it is stated, is the convenient

emptying odorless stew and fry pan, as illustrated herewith. The utensil is stamped seamless from smooth surface, cold rolled Swedish steel, with the odor flue riveted on the outside. Fig. 1 shows

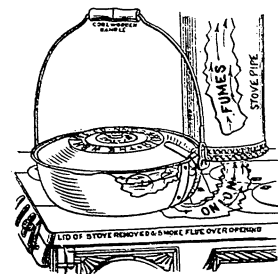


Fig. 1.—Odorless Stew and Fry Pan.

the pan in use with the cover closed, and with the bail and cool handle in a vertical position out of the heat and away from the other utensils on the stove. The point is made that the handle is always cool and not in the way, as with a saucepan or spider handle. The cut also indicates the way in which the fumes of cooking onions are carried up the stove pipe. In Fig. 2 the lid of the

pan is automatically raised by pressing down on the handle, while it is explained that the reverse motion instantly places the cover again in position over the pan, and that the lid can be automatically raised by depressing the handle in either direction. The cover can be

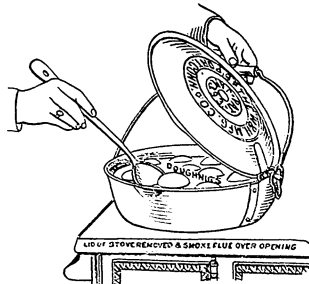


Fig. 2.—Automatic Cover Raiser.

raised and the handle automatically locked in position to pour the contents from the pan, as illustrated in Fig. 3. The cover and handle are removed for shipping by taking out the hinge pin. The manufacturers claim that the utensil is light and durable, heating evenly and quickly and is instantly adjusted by the

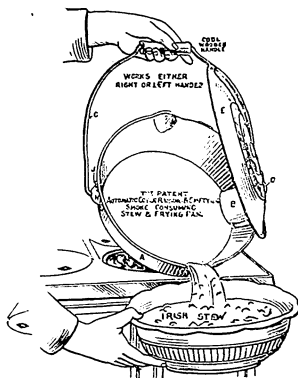


Fig. 3.—Automatic Lock for Pouring.

cool handle; also, that it is sure to prevent all odors and smoke from filling the room. The fact is emphasized that burning the fingers is avoided, as the cover works automatically and is always in place.

Lefever Automatic Ejector Gun.

Lefever Arms Company, Syracuse, N. Y., have put on the market an auto-

matic ejector gun as herewith shown. It is explained that the invention consists of two elliptic springs working in the fore end of the gun, bearing directly on the ejectors. These springs operate the same as the main springs in the locks and are less liable to breakage, it is stated, on account of not having so far to travel. An advantage claimed in having the springs so arranged is that every piece is in plain sight and can readily be taken apart to clean in the event of their becoming gummed up from the use of poor oil. It is further explained that by moving the button on the bottom of the fore end back toward the breech of the gun, the springs are shut off and the gun will not eject the shell except in the ordinary way. It is pointed out that should a sportsman be shooting from a boat or other position where he may not wish to throw out the shell, a single movement gives him a gun suited to the occasion. It is further explained that the construction of the ejector does not in any way change or interfere with the action of the gun, thus leaving the check hook, square shoulder top fastener and compensating features intact; also that each and every part is made to gauge and can be duplicated immediately upon order. The gun was thoroughly tested by the makers before putting it on the market with the most satisfactory results.

Plain All-Steel Pulley.

The Fox Machine Company, 126 North Front street, Grand Rapids, Mich., are making two styles of steel

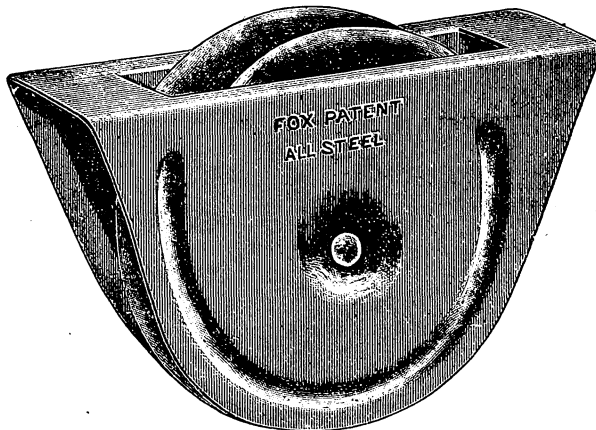


Fig. 1.—Plain All-Steel Pulley.

pulleys, one known as the plain pulley, shown in Figs. 1 and 2, and the other a corrugated snell pulley, an illustration

from turning and the shell from being pressed together. The rivet forms the axle and is $\frac{1}{2}$ -inch in diameter. Fig. 2 also shows a section of the steel wheel, which consists of two steel disks pressed

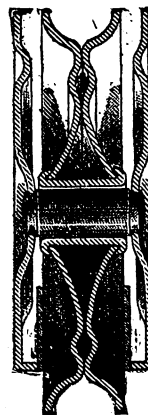
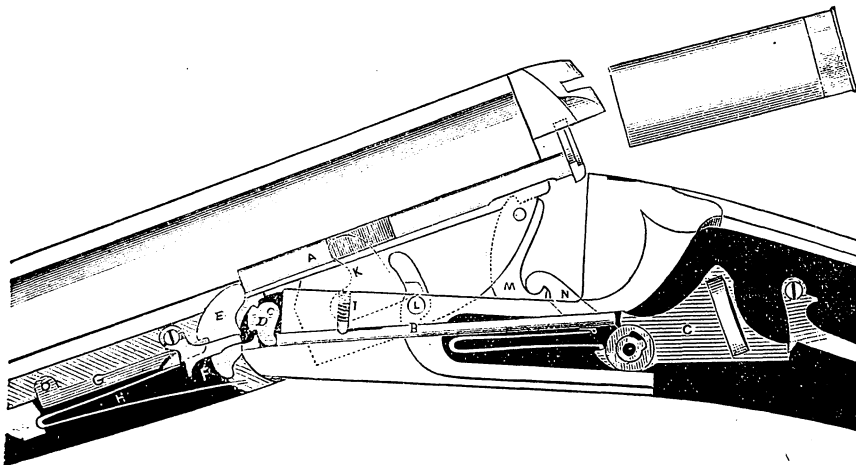


Fig. 2.—Section through Center of Plain Pulley.

into proper shape and held together by a steel tube rolled over at each end, which is designed to hold the two halves of the wheel firmly together and to form a smooth, true bearing. The manufacturers claim that the pulley is strong, light and cheap, requiring no nails or screws to hold it in place. They call attention to the fact that they make a



Lefever Automatic Ejector Gun.

matic ejector gun as herewith shown. It is explained that the invention consists of two elliptic springs working in the fore end of the gun, bearing directly

of which appeared in *The Iron Age*, July 6, 1893. The rivet shown in Fig. 2 has a milled shoulder on each end, riveted tight to the shell, to prevent the rivet

machine especially for mortising the plain pulley, which, they state, will cut the four moldings in a window frame in less than three minutes.

What is claimed to be the largest girder ever shipped in one piece has been put in place in the new Broad street station of the Pennsylvania road at Philadelphia. It is 58 feet 1 inch long, 10 $\frac{1}{2}$ feet in height, and rests on a plate 2 feet 6 inches broad. The Philadelphia Bridge Company, its makers, claim that this giant, weighing 110,780 pounds, is the heaviest and largest steel girder ever turned out complete by an iron works in the United States. The girder is placed across Fifteenth street, on the south side of the station, and is designed to support the weight of the seven stories of brick of the office building on the Market street front.

The advisability of using sand filters in the Croton watershed, from whence New York receives its water, is now being considered. Although filter beds are used in England, there are none in this country built on a large scale.

Current Hardware Prices.

JULY 12, 1893.

Note.—The quotations given below represent the Current Hardware Prices which prevail in the market at large. They are not given as manufacturers' prices, and manufacturers should not be held responsible for them. In cases where goods are quoted at lower figures than the manufacturers name, it is not stated that the manufacturers are selling at the prices quoted, but simply that the goods are being sold, perhaps by the manufacturers, perhaps by the jobbers at the figures named.

The character @ is used to indicate a range of price; thus discount 50&10@50&10&5 signifies that the goods in question are sold at prices ranging from discount 50 and 10 % to discount 50 and 10 and 5 %.

Adjusters, Blind—

Domestic..... \$ doz \$2.00, 33¢
Excelsior..... \$ doz \$10.00, 11¢
North's..... \$ doz \$1.00, 11¢ net @ 10%
Zimmerman's—See Fasteners Blind.

Ammunition—See Caps, Cartridges, Shells, &c.

Anvils—

Eagle Anvils, \$ 10 9¢..... 15&15&5¢
Peter Wright's..... 11&11¢
Armstrong's..... 10¢
Wrought, Horse shoe brand, 11¢
Trenton..... 10¢
Wilkinson's..... 10¢
Moore & Ames Mfg. Co..... 33¢

Anvil Vise and Drill—

Millers Falls Co., \$18.00..... 20%
Cheney Anvil and Vise..... 25%
Allen Anvil and Vise \$3.00..... 40&10%
Star..... 45&5¢

Apple Parers—See Parers. Apple, &c.

Augers and Bits—

Common Augers and Bits..... 70&70&10%
Boring Machine Augers..... 70&70&10%
Car Bits, 12-in. twist..... 50%
Russell Jennings' Augers and Bits..... 25&10%
Jennings' Pattern Auger Bits..... 40%
Jennings' Pattern Auger Bits..... 60%
Snell's Bits..... 60&5¢
C. E. Jennings & Co., No. 10, extension up..... 40%
C. E. Jennings & Co., No. 30..... 80%
C. E. Jennings & Co. Auger Bits, \$ set, 32¢
quarters, No. 6, \$5; No. 30, \$3.50, 25%
Lewis' Patent Single twist..... 45%
Pugh's Black..... 20%
Pugh's Jennings Pattern..... 30%
L'Hommedieu Car Bits..... 15&10%
Forester Pat. Auger Bits..... 15%
Cincinnati Bell-Hangers' Bits..... 30&10%

Bit Stock Drills—

Morse Twist Drills..... 50&10&5%
Standard..... 50&10&5%
Cleveland..... 50&10&5%
Syracuse, for metal..... 50&10%
Syracuse, for wood (wood list)..... 30&30&5%
Cincinnati, for wood..... 30&10%
Cincinnati, for metal..... 45&10%

Expansive Bits—

Clark's small, \$18; large, \$26, 35¢@35&10%
Ives' No. 4, \$ doz \$80..... 40%
Evan's..... 40%
Steer's, No. 1, \$18; No. 2, \$18..... 35&40%
Searns' No. 2, \$48..... 20%

Gimlet Bits—

Common..... \$ gross \$2.75@3.25
Diamond..... \$ doz \$1.25, 40&10%
See..... 25&25&5%
Double Cut, Shepardson's..... 45&45&10%
Double Cut, Ct. Valley Mfg. Co..... 30&10%
Double Cut, Hartwell's, \$ gro., \$5.00, 25%
Double Cut, Douglass..... 40&10%
Double Cut, Ives..... 60&60&10%
Hollow Augers—
Ives'..... 33¢@33%
French, Swift & Co. (Beecher)..... 40%
Douglass..... 40%
Bonney's Adjustable, \$ doz \$48..... 50%
Searns'..... 20&10%
Ives' Expansive, each \$4.50..... 60&5%
Universal Expansive, each \$4.50..... 20%
Wood's..... 25&25&10%
Cincinnati Adjustable..... 25&10%
Cincinnati Standard..... 25&10%

Ship Augers and Bits—

L'Hommedieu's..... 15&10&15&10&5%
Watrous..... 25&25&10%
Snell's..... 25&25&10%
Snell's Ship Auger Pat'n Car Bits, 15&10&15&10&5%

Awl Hafts—See Hafts, Awl.

Awls—

Awls, Sewing, Common..... \$ gr. 85¢@90¢
Awls, Should. Peg..... \$ gr. \$1.50@1.55
Awls, Pat. Peg..... \$ gr. 85¢@88¢
Awls, Shouldered Brad..... \$ gr. \$1.30@1.40
Awls, Handled Brad..... \$ gr. \$2.50@3.00
Awls, Handled Scratch..... \$ gr. \$4.00@4.50
Awls, Socket Scratch..... \$ doz. \$1.10@1.20

Awl and Tool Sets—See Sets, Awl and Tool.

Axes—

First quality, best brands..... \$7.50
First qual., other brands..... 6.50
Second quality..... 5.75

Axle Grease—See Grease, Acls.

Axles—

No. 1..... 3¢@4¢, No. 2, 5¢@6¢
Nos. 7 to 14..... 60&10%
Nos. 15 to 18..... 47%
Nos. 19 to 22..... 70%
Concord Axles, loose collar..... 4¢@6¢
Concord Axles, solid collar..... 4¢@6¢
National Tubular Self Oiling..... 38¢@38%
See also Machines, Hotsting.

Bag Holders—See Holders, Bag.

Balances—

Spring Balances..... 40%
No. 2000 20 30
Chatillon, \$ doz..... \$0.80 0.95 1.75 net
Chatillon Straight Balances..... 40%
Chatillon Circular Balances..... 50&10%

Barb Wire—See Wire, Barb.

Bars—

Crow—
Cast Steel..... \$ doz \$3¢
Iron, Steel Points..... \$ doz \$3¢

Basins, Wash—

Standard Fiberglass, No. 1, 10¢-in., \$1.80;
12-inch, \$2.00; 13¼-inch, \$2.50; 15-inch, \$3.00.

Beams, Scale—

Scale Beams, List Jan. 12, '82, 50&10%
Chatillon's No. 1..... 40%
Chatillon's No. 2..... 50%
Custer's..... 33&4¢

Beaters—

Egg—
Dover..... \$ doz \$1.00@1.20
Duplex (Standard Co.)..... \$ doz \$1.00
Dover (Standard Co.)..... \$ doz \$1.00
Duplex Extra Heavy (Standard Co.)..... \$ doz \$3.50
Bryant's..... \$ gross \$14.00
Double (H. & R. Mfg. Co.), No. 0, No. 1, \$12.00; No. 1, \$15.00; No. 2, \$20.00
Easy (H. & R. Mfg. Co.)..... \$ gro \$16.50
Triple (H. & R. Mfg. Co.)..... \$ gro \$4.25 @ \$4.50
Improved Acme (H. & R. Mfg. Co.)..... \$ gro \$9.00
Silver & Co..... \$ doz \$5.50

Culinary—

Keystone, P. D. & Co., Each, No. 1, \$1;
No. 2, \$2

Bells—

Cow—
Common Wrought..... 60&10%
Western, Sargent's list..... 70&10%
Kentucky, Star..... 20&10%
Kentucky, Sargent's list..... 70&10%
Kentucky, Durham..... 70&10%
Dodge, Genuine Kentucky..... 70&70&10%
Texas Star..... 50&10&50&10&5%

Door—

Gong, Abbe's..... 33%
Gong, Yanksee..... 45&10%
Gong, Barton's..... 40&10&50%
Crane, Brooks'..... 50&10&2%
Crane, Cone's..... 10%
Crane, Connel's..... 20&10%
Lever, Sargent's..... 60&10%
Lever, Taylor's Bronzed or Plated..... no
Lever, Taylor's Japaned..... 25&10%
Lever, R. & E. Mfg. Co.'s..... 50&10&2%
Pull, Brooks'..... 50&10&2%

Electric—

Wellensak's..... 20%
Bigelow & Dowse..... 20%

Hand—

Light Brass..... 70&10&70&10&5%
Extra Heavy..... 70%
White..... 70%
Silver Chime..... 33%
Globe Cone's Patent..... 25&10&35%

Miscellaneous—

Call..... 45&50%
Farm Bells..... \$ doz \$3.50@4%
Steel Alloy Church and School Bells..... 40%

Bellows—

Blacksmiths'..... 60&10&50&60&10&10%
Molders'..... 40&10&50%
Hand Bellows..... 40&10&50%

Belting, Rubber—

Common Standard..... 75&75&10%
Standard..... 70&50&70&10%
Extra..... 60&10&60&10&10%
N.Y.B.&P. Co., Carbon..... 60&60&5%
N.Y.B.&P. Co., Diamond..... 60&60&5%
N.Y.B.&P. Co., Para..... 40&40&5%

Bench Stops—See Stops, Bench

Benders and Upsetters, Tire—

Stoddard's Lightning Tire Upsetters..... 15%
Detroit Perfected Tire Bender..... 15%
Green River Tire Benders and Upsetters..... 20%

Bits—

Auger, Gimlet, Bit Stock Drills, &c., see Augers and Bits.

Bit Holders—See Holders.

Blind Adjusters—See Adjusters, Blind.

Blind Fasteners—See Fasteners, Blind.

Blind Staples—See Staples, Blind.

Blocks—

Cleveland Block Co., Mal. Iron, 50&50&10%
Morse Novelty, Mal. Iron..... 50%
Sure Grip Steel Tackle Blocks..... 25%
See also Machines, Hotsting.

Bolts—

Carriage, Machine, &c.—

Com. list June 10, '84..... 75&10&50&80%
Genuine Eagle, Norway, list Oct. '84..... 80%
Eagle, Norway, list Oct. '84..... 80&50&80&10%
P.A. pattern, list Oct. 7, '84..... 80%
R.B. & W., old list..... 70%
Machine, list Jan. 1, 1890..... 80&10%
Bolt Ends, list Jan. 1, 1890..... 80&10%

Door and Shutter—

Cast Iron Barrel, Square, &c..... 70&10%
Cast Iron Shutter Bolts..... 70&10%
Cast Iron Chain (Sargent's list)..... 60&10%
Ives' Patent Door Bolts..... 60&10&60&10&5%
Wrought Barrel..... 70&10&75%
Wrought Square..... 70&10&75%
W.R. Shutter, all iron, Stanley's..... 60&10&60&10&10%
W.R. Shutter, Brass Knob..... 50&50&5%
W.R. Shutter, Sargent's list..... 60&10%
W.R. Sunk Flush Sargent's list..... 60&10%
W.R. Sunk Flush, Stanley's list..... 50&10&5%
W.R. B. K. Flush, Common..... 55&10%

Stove and Plow—

Stove..... 60&10&60&10&5%
Plow..... 60&10&50&60&10&10%
R. B. & W., Plow..... 55%

Tire—

Common, list Feb. 28, '83..... 65&65&5%
Port Chester Bolt and Nut Company:
Empire list Feb. 28, '83..... 65%
Keystone, Philadel., list Oct. '84..... 80%
Norway, Phila., list Oct. '84..... 75%
Norway, Phila., list Oct. 16, '84..... 75%
Eagle, Phila., list Oct. 16, '84..... 80%
Philadel., list Oct. 16, '84..... 80%
Bay State, list Feb. 28, '83..... 65%
R. B. & W., Philadel., list Oct. 16, '84..... 80%

Borers, Tap—

Common and Ring..... 20&10%
Ives' Tap Borers..... 33%
Enterprise Mfg. Co..... 20%
Clark's..... 33%@35%

Borax—

Per D..... 9%@10%
Chinese, Boring.

Bow Pins—See Pins, Bow.

Boxes, Wagon—

Per D..... 23¢

Boxes, Miter.

Spiker's Excelsior, 3 in. \$7.50, 4 in. \$8.50, 5 in. \$13.00, 6 in. \$15.00..... 20%

Braces—

American Bit Brace and Tool Co.
Nos. 10, 12, 20..... 60&10%
Nos. 11, 21, 24, 27..... 70&10%
Nos. 22, 23, 25..... 60&10&5%
Nos. 13, 26, 36, 37..... 70&10&5%
Amidon's
Barker's Imp'd Plain..... 75&10&80%
Barker's Imp. Nickeled..... 65&10&70%
Ratchet..... 75&10&80%
Bishop's..... 60%
Globe Jawed..... 40&40&10%
Corner Brace..... 40&40&10%
Universal, 8 in. \$2.10; 10 in. \$2.25
Buffalo Ball..... \$1.10@1.15
Barber's..... 60&10%

Saxon's
Barker's Imp. Polished..... 75&10&80%
Barker's Imp. Nickeled..... 65&10&70%
Ratchet, Polished..... 50&10&60%
Ratchet, Nickeled..... 40&10&60%
Buffalo Ball..... \$1.10@1.15
Bartholomew's
Nos. 25, 27 and 30..... 50&10&60&5%
Nos. 117, 118, 119..... 70&70&5%
Common Ball, American..... \$1.00@1.10
Fray's Genuine Spofford..... 50&50&10%
Fray's Nos. 70 to 120, 81 to 123, 207 to 414..... 60&10%
Ives' New Haven Novelty..... 70&70&5%
New Haven Ratchet..... 60&50&60&10%
Barber Ratchet..... 60&50&60&10%
Barber's..... 60&5%
Spofford..... 60&50&60&10%
P. S. & W. Co., Peck's Patent..... 60%
Rose & Johnson..... 60%
Davis Patent..... 60&10%

Brackets—

Shelf, plain, Regular, list..... 65&70%
Sargent's list..... 60&10&70&10%
Shelf, fancy, list..... 70&70&10%
Other makes at a wide range of prices.
Bradley Shelf Brackets..... 70&10%

Bright Wire Goods—See Wire.

Broilers—

Hens' Self-Inch..... 9 10 9x11
Easting Per doz..... \$4.50 5.50 6.50
New Haven..... 60%
Wire Goods Co..... 65&10%
Morgan Odorless..... \$ doz. \$12, 50%
Queen City..... 33%
See also Machines, Hotsting.

Buckets, Well—

Galvanized—

Hill's..... \$ doz. 12 qt. \$4.25; 14 qt. \$5.25
Belwig's Flat Iron Band..... \$3.75
Helwig's Wired Top..... \$ doz \$4.00

Bull Rings—See Rings, Bull.

Butcher's Cleavers—See Cleavers, Butcher's.

Brass—

Wrought Brass..... 80&80&10%
Cast Brass, Tiebout's..... 50%
Cast Brass, Past..... 33%
Cast Brass, Loose Joint..... 33%
Cast Iron—

Fast Joint, Narrow..... 50&10&50&80%
Fast Joint, Broad..... 50&10&60%
Loose Joint..... 50&10&60%
Loose Joint, Japanned..... 75&7%
Loose Joint, Jap. with Acorns..... 80%
Parliament Butts..... 75&7%
Mayer's Hinges..... 80%
Loose Pin, Acorns..... 50%
Loose Pin, Acorns, Japanned..... 50%
Loose Pin, Acorns, Japanned, Plated Tips..... 50%
Wrought Steel—

Fast Joint, Narrow..... 50&50&10%
Fast Joint, Lt. Narrow..... 50%
Fast Joint, Broad..... 50%
Loose Joint, Broad..... 50%
Table Butts, Back Flaps, &c..... 50%
Inside Blind, Regular..... 50%
Inside Blind, Light..... 50%
Loose Pin..... 50%
Bronzed Wrought Butts..... 50&50&10%
List Jan. 2 1893. 40&10&10%

Calipers—See Compasses.

Calks, Toe—

Gautier, One Prong, Blunt..... 5¢
Burke's One Prong, Blunt..... 5¢
Burke's, Two Prong, Blunt..... 7¢
Burke's, One Prong, Sharp..... 6¢

Can Openers—See Openers, Can.

Cans, Milk—

S. S. & Co.: 5-gal., \$2.00; 8-gal., \$4.40;
10-gal., \$4.75 each..... 40&10%

Caps—

Percussion—
Hicks & Goldmark's and Union Metallic Cartridge Co. \$ 100%
F. L. Waterproof, 1-10's..... 35¢
E. B. Trimmied Edge, 1-10's..... 47¢
E. B. Grand Edge, Cent. Fire, 1-10's..... 47¢

Musket, Waterproof, 1-10's..... 50¢
G. D..... 27¢
S. B. Genuine Imported..... 45¢
Eley's E. B..... 50¢
Eley's D Waterproof, Central Fire..... 51¢

Primers—

Berdan Primers, \$1.00..... 2¢
B. L. Caps (Sturtevant Shells) \$1.00..... 2¢
All other Primers, \$1.20..... 2¢

Cards—

Watson's Cotton, Wool, Horse and File, list January 28, 1891..... 33%

Carpet Stretchers—See Stretchers, Carpet.

Cartridges—

Rim Fire Cartridges..... 50&50&5%
Rim Fire Military..... 15&2%
Cent. Fire, Pistol and Rifle..... 25&25&2%
Cent. Fire, Military and Sporting..... 45&5%
Blank Cartridges, except 22 and 32 cal., additional 10% to above discounts.
Blank Cartridges, 22 cal., \$1.75..... 2%
Blank Cartridges, 32 cal., \$3.50..... 2%
Primed Shells and Bullets..... 15&25%
B. B. Caps, Round Ball, \$1.75..... 2%
B. B. Caps, Con. Ball, Swgd., \$2.00..... 2%

Carpet Sweepers—See Sweepers, Carpet.

Casters—

Bed..... \$ Brass..... 55¢
Plate..... \$ Others..... 60¢
Shallow Socket..... 40¢
Deep Socket..... 40¢
Martin's Patent (Phoenix)..... 45¢
Tucker's Patent, low list..... 45¢
Payson's Anti-friction..... 70¢
Payson's Truck..... 60¢
Yale Casters, low list..... 45¢
Yale, Gem..... 70¢
Giant Truck Casters..... 50¢
Stationary Truck Casters..... 50¢
Socket Truck Casters..... 50¢
Gwinner's Common Sense..... 45¢
Gwinner's Hercules..... 45¢

Cattle Leaders—See Leaders, Cattle.

Cement—

Victor Elastic..... 5¢ pails

Chain—

Trace, Wagon and Fancy Chains, List revised May, 1893..... 60¢
American Coil, in cash lots, 3-16 5-16 7-16 9-16 11-16 13-16 15-16 17-16 19-16 21-16 23-16 25-16 27-16 29-16 31-16 33-16 35-16 37-16 39-16 41-16 43-16 45-16 47-16 49-16 51-16 53-16 55-16 57-16 59-16 61-16 63-16 65-16 67-16 69-16 71-16 73-16 75-16 77-16 79-16 81-16 83-16 85-16 87-16 89-16 91-16 93-16 95-16 97-16 99-16 101-16 103-16 105-16 107-16 109-16 111-16 113-16 115-16 117-16 119-16 121-16 123-16 125-16 127-16 129-16 131-16 133-16 135-16 137-16 139-16 141-16 143-16 145-16 147-16 149-16 151-16 153-16 155-16 157-16 159-16 161-16 163-16 165-16 167-16 169-16 171-16 173-16 175-16 177-16 179-16 181-16 183-16 185-16 187-16 189-16 191-16 193-16 195-16 197-16 199-16 201-16 203-16 205-16 207-16 209-16 211-16 213-16 215-16 217-16 219-16 221-16 223-16 225-16 227-16 229-16 231-16 233-16 235-16 237-16 239-16 241-16 243-16 245-16 247-16 249-16 251-16 253-16 255-16 257-16 259-16 261-16 263-16 265-

Chalk Lines—See *Lines*.
Checks, Door—
Only.....50%
Chisels—
Socket Framing and Firmer
P. S. & W.....
New Haven.....
Wichby.....
75¢10¢75¢10¢10%
Ohio Tool Co.....
Douglass.....75¢75¢5¢
Buck Bros.....30%
Merrill.....60¢10¢60¢10¢5¢
L. & J. White.....30¢30¢5¢
Tanged and Miscellaneous
Tanged Firmers.....50¢50¢10%
Butchers.....\$4.75¢\$5.00
Spear & Jackson's.....\$5 to \$2
Buck Bros.....30%
Cold Chisels, # 1.....15¢16¢
Chucks—
Beach Pat.....each, \$8.00.....20%
Morse's Adjustable, each, \$7.00, 20¢20%
Danbury.....each, \$6.00, 30¢30¢5¢
Syracuse, Balz Pat.....25%
Graham Patent.....33%
Skinner's Patent.....33%
Combination Lathe Chucks.....33%
Universal Lathe Chucks.....40%
Independent Lathe Chucks.....40%
Drill Chucks.....15%
Union Mfg. Co.....
Victor.....\$8.50, 25%
Combination.....40%
Independent.....40%
Churns—
Tiffin, Union, each, 5 gal. \$3.25; 7 gal.,
\$3.75; 10 gal., \$4.25.
McDermald Star Barrel Churn, each
6 gal., \$2.60; 10 gal., \$2.75; 15 gal.,
\$3.00; 20 gal., \$3.25.
Clamps—
R. I. Tool Co.'s Wrought Iron.....25%
Adjustable, Cincinnati.....15¢10%
Adjustable, Hammers.....15¢15¢5¢
Adjustable, Stearns.....30¢30¢10%
Stearns's Adjustable Cabinet and
ner.....30¢30¢10%
Cabinet, Sargent's.....70¢10%
Carriage Makers, Sargent's.....75¢75¢5¢
Carriage Makers, P. S. & W. Co.....40¢10%
Eberhard Mfg. Co.....40¢40¢10%
Warner's.....40¢10¢40¢10%
Saw Clamps, V. C. V. Saw Filers.....25%
Carpenter's, Cincinnati.....25¢10%
Barnes' Machinists' Clamps.....33%
Cleavers, Butchers'—
Bradley & Co.....25¢30%
L. & J. White.....20%5¢
Beatty's.....40¢40¢5¢
New Haven Edge Tool Co.'s.....40%
P. S. & W.....33%5¢33%10%
Foster Bros.....30%
Schulte, Lohoff & Co.....40¢40¢5¢
Clips—
Norway, Axle, ¼ & 5-16.....55¢5¢5¢
Edgegrade Norway, Axle, ¼ & 5-16.....55¢5¢
Superior Axle Clips.....60¢30%
Norway Spring Bar Clips, 5-16.....30¢5¢5¢
Wrought Iron Felloe Clips.....# 1, 5¢
Steel Felloe Clips.....# 1, 5¢
Baker Axle Clips.....# 1, 5¢
Cloth and Netting, Wire—
See *Wire, &c.*
Cockeyes.....50%
Cocks Brass—
Hardware list.....60¢2%
Coffee Mills—See *Mills, Coffee*.
Collars, Dog—
Chapman & Co., many, new list.....40%
Medford Farm Goods Co.....40¢10¢50%
Embossed, Gift, Pope & Steven's list.....30¢1%
Leather, Pope & Steven's list.....40%
Brass, Pope & Steven's list.....40%
Combs, Curry—
Fitch's.....50¢10¢50¢10¢10%
Rubber, per doz.....10%
American Curry Comb Co.....33%40%
Kohler's Magic Oscillating.....# doz., \$2.00
Kehler's Humane.....# doz., \$1.75
Compasses, Dividers, &c.
Compasses, Callipers, Dividers, 70¢70¢10%
Bemis & Call Co.'s.....
Dividers.....65%
Compasses.....60¢5¢
Callipers, Inside or Outside.....50%
Callipers, Wing.....50%
Callipers, Double.....65%
Callipers, Call's Patent Inside.....55%
Excelsior.....50%
J. Stevens & Co.'s.....25¢10%
Starrett's.....
Spring Callipers and Dividers.....25¢10%
Lock Callipers and Dividers.....25%
Combination Dividers.....25%
Coolers, Water—
S. S. & Co.: 2-gal., \$2.00; 3-gal., \$2.50;
4-gal., \$2.75; 6-gal., \$3.40 each.....33%
Coopers' Tools—
See *Tools, Coopers'*.
Cord—
Sash—
Common.....# 1, 9¢10¢
Patent, good quality.....# 1, 11¢12¢
White Cotton Braided, fair.....# 1, 24¢25¢
Common Russia Sash.....# 1, 12¢13¢
Patent Russia Sash.....# 1, 12¢14¢
Cable Laid Italian Sash.....# 1, 12¢22¢
India Cable Laid Sash.....# 1, 11¢12¢
Silver Lake.....
A quality, White, 50¢.....25%
A quality, Drab, 55¢.....25%
B quality, White, 30¢.....10%
B quality, Drab, 30¢.....10%
Sylvan Spring, Extra Braided, White, 30¢
Sylvan Spring, Extra Braided, Drab, 30¢
Semper Idem, Braided, White, 27¢28¢
Egyptian, India Hemp, Braided.....25%
Massachusetts, White.....25%
Samson.....
Braided, White Cotton.....# 1, 37¢
Braided, Drab Cotton.....# 1, 42¢
Braided, Italian Hemp.....# 1, 40¢
Braided, Linen.....# 1, 56¢
Tate's Solid Braided.....
Hercules, White.....# 1, 25¢
Hercules, Drab.....# 1, 25¢
Economy Drab.....# 1, 27¢
Economy White.....# 1, 27¢
Common Mills.....
Braided Giant, White # 1, 80¢.....20%
Braided Giant, Drab and Fancy, # 1, 85¢
25

graded, Crown White, # 1, 50¢.....50%
graded, Crown Drab and Fancy, # 1, 50¢
55.....50%
Wire Picture—
Braided or Twisted.....80¢5¢80¢15%
Corkscrews—See *Screws, Cork*.
Corn Knives and Cutters—
See *Knives, Corn*.
Crackers Nut—
Table (H. & B. Mfg. Co.).....40%
Blake's Pattern, # doz., \$2.00.....10%
Turner & Seymour Mfg. Co.....50%
Acme.....
Japanned, # gro., \$30.....50%
Nickel Plated, # gro., \$30.....10%
Cradles—
Grain.....50¢2¢50¢5¢2%
Crayons—
White Crayons, # gross.....7¢3¢
D. M. Stewart Mfg. Co.....
Metal Workers' # gross, \$1.75.....25%
Rolling Mill, # gross, 2.50.....25%
Railroad, # gross, 2.00.....25%
Soapstone Pencils, # gross, 1.00.....25%
See also *Chalk*.
Creamery Pails—See *Pails, Creamery*.
Crow Bars—See *Bars, Crow*.
Curry Combs—
See *Combs, Curry*.
Curtain Pins—
See *Pins, Curtain*.
Cutters—
Meat—
Dixon's, # doz.....40¢10¢5%
Nos.....1 2 3 4
\$14.00 \$17.00 \$19.00 \$30.00
Woodruff's, # doz.....40¢10%
Nos.....100 150
\$15.00 \$18.00
Hale's, # doz.....70%
Nos.....11 12 13
\$27.00 \$33.00 \$45.00
American.....30%
Nos.....1 2 3
\$5 \$7 \$10 \$25 \$50 \$80
Enterprise.....25%
Nos.....10 12 22 32 42
Each.....\$3 \$2.50 \$4 \$6 \$15
Little Giant, # doz.....40¢10%
Nos.....305 310 312 320 322
\$85.00 \$88.00 \$44.00 \$72.00 \$65.00
Triumph No. 505, # doz., \$21.00.....25%
Miles' Challenge, # doz.....45¢45¢10%
Nos.....1 2 3
\$22.00 \$30.00 \$40.00
Home No. 1, # doz., \$28.00.....55¢10%
Draw Cut, each.....
Nos.....5 6 8
\$50 \$75 \$90 \$225.....20¢25%
Beef Shavers (Enterprise).....20%
Chadborn's Smoked Beef Cutter, # doz.,
\$86.00
Slaw and Kraut—
Tucker & Dorsey Mfg. Co.:
Slaw Cutters, 1 Knife, # gross.....\$21.00
Slaw Cutters, 2 Knife, # gross.....30.00
Kraut Cutters.....40%
Tobacco—
Champion.....20¢10¢30%
All Iron.....# doz., \$4.25
Nashua Lock Co.'s, # doz., \$18.00, 50¢55%
Wilson's.....55%
Sargent's.....# doz., \$24.00, 55¢10%
Acme.....# doz., \$20.00, 40%
Washer—
Smith's Pat.....# doz., \$12.00, 20¢10¢10%
Johnson's.....# doz., \$11.00, 33%
Penny's, # doz., \$14, Jap'd, \$16, 55%
Appleton's.....# doz., \$18.00, 60¢10%
Bonney's.....30¢10%
Cincinnati.....25¢10%
Dampers, &c.—
Dampers, Buffalo.....50%
Metal Damper Clips.....40%
Crown Damper.....40%
Excelsior Hot Air.....50%
Diggers, Post Hole, &c.—
Samson, # doz., \$34.00.....25¢25¢10%
Fletcher Post Hole Augers, # doz., \$36.00.....20¢20¢10%
Eureka Diggers.....# doz., \$12.00, \$13.00
Vaughan's Post Hole Auger, # doz.,
\$8.50, \$9.50
Kohler's Little Giant.....# doz., \$18.00
Kohler's Hercules.....# doz., \$14.00
Kohler's Invincible.....# doz., \$12.00
Kohler's New Champion.....# doz., \$8.00
Schneider.....# doz., \$18.00
Cronk's Post Bars, # doz., \$80.00.....
Gibb's Post Hole Digger.....# doz., \$15.00
Gibb's National.....# doz., \$13.00
Gibb's Columbia.....# doz., \$13.00
Gibb's Imperial.....# doz., \$7.50
Shimer's Hollow Handle.....# doz., \$24.00, 50%
Dividers—See *Compasses*.
Dog Collars—See *Collars, Dog*.
Door Checks—
See *Checks, Door*.
Door Springs—
See *Springs, Door*.
Drawers—
Money, # doz.....\$18¢\$20
Wadell's Improved, # doz.....\$15.00
Drawing Knives—
See *Knives, Drawing*.
Drills and Drill Stocks—
Blacksmiths.....each \$1.75
Blacksmiths' Self-Feeding, each \$7.50, 20%
Ereast, P. S. & W.....40¢10%
Ereast, Wilson's.....30¢5%
Ereast, Millers Falls.....each \$3.00, 25%
Ereast, Bartholomew's.....each \$2.50
Ratchet, Merrill's.....25¢10¢40%
Ratchet, Ingersoll's.....25%
Ratchet, Parker's.....20¢20¢5%
Ratchet, Whitney's.....20¢10%
Ratchet, Weston's.....20¢25%
Ratchet, Moore's Triple Action.....25¢30%
Ratchet, Curtis & Curtis.....30%
Whitney's Hand Drill, Plain, \$11.00,
Adjustable, \$12.00.....20¢10%
Automatic Boring Tools.....\$1.75¢\$1.85
Chleoper Automatic Drill.....20¢10%
Goodell Automatic Drills.....40¢5%
Twist Drills—
Cleveland.....50¢10¢10%
Dixond, W. & C.....50¢10%
Graham's Pat. Groove Shank.....50¢10%
Morse.....50¢10%
New Process.....50¢10%
Standard.....50¢10%
Syracuse (Metal list).....50¢10%

Drill Bits or Bit Stock
Drills—See *Augers and Bits*.
Drill Chucks—See *Chucks*.
Dripping Pans—
See *Pans, Dripping*.
Drivers, Screw—
Douglass Mfg. Co.....20¢20¢10%
Dissott's.....50%
Buck Bros.....30%
Stanley R. & Co.'s.....
No. 64, Varnished Handles.....65¢10%
No. 86.....70¢10%
Sargent & Co.'s.....
No. 1, Forged Blade.....60¢10¢10%
Nos. 20, 40 and 60.....60¢10¢10%
P. S. & W.....70%
Knapp & Cowles.....
No. 1.....60¢20¢70%
No. 2.....60¢10¢10¢70%
No. 3.....60¢5¢60¢10%
Nos. 4 and 00, Acme and Ideal.....50¢5%
Stearns.....50¢10¢5%
Gay & Parsons.....25¢10¢5%
Champion.....25%
Clark's Pat.....30¢33%
Ehrlich's Socket and Ratchet.....25¢10%
Allard's Spiral, new list.....25%
Kolb's Common Sense, # doz., \$6.00.
Syracuse Screw-Drive Bits.....25¢10%
Screw Driver Bits.....30¢30¢5%
Screw Driver Bits, Parr's, # gross, \$6.25
Fray's Hol. H die Sets.....No. 3, \$12.00, 45%
Cincinnati.....25¢10%
Brace Screw Drivers.....25¢10%
Buck Bros' Screw Driver Bits.....27%4%
Goodell Automatic.....50%
Mayhew's Bit & Handle.....45¢10%
Mayhew's Monarch.....45¢10%
C. T. Williamson Wire Novelty Co.....50%
Egg Beaters—See *Beaters, Egg*.
Egg Poachers—
See *Poachers, Egg*.
Electric Bell Sets—
See *Bells, Electric*.
Emery—No. 4 to No. 54 to Flour, CF.
48 gr. 150 gr. F.F.F.
Kegs, # d.....4% 5 2%
24 kegs, # d.....4% 5 2%
24 kegs, # d.....5% 5 3%
10-cans, 10.....6 6%
10-cans, less than 10.....10 10 7%
Enameled and Tinned Ware—See *Ware, Hollow*.
Escutcheon Pins—
See *Pins, Escutcheon*.
Escutcheons—
Door Lock.....Same dis. as Door Locks.
Brass Thread.....60¢60¢10%
Wood.....25%
Expanded Metal—
List No. 5.
Lathing.....10%
Fencing, Painted Sheets.....20%
Netting, Painted Sheets.....20%
Door Mats, Galvanized.....15%
Window Guards, Paneled.....15%
Tree Guards, Paneled.....15%
Extractors, Lemon Juice—
See *Squeezers, Lemon*.
Fasteners, Blind—
Mackrell's, # doz., \$1.00.....20¢20¢10%
Van Sand's Screw Pat, \$15 # gr.....60¢10%
Van Sand's Old Pat, \$15 # gr.....55¢10%
Austin & Eddy No. 2008.....# gr., \$9.00
Security Gravity.....# gr., \$9.00
Zimmerman's.....50¢10%
Faucets—
Fenn's.....40%
Fenn's Cork Stops.....33%
Star.....60%
Frary Pat. Petroleum.....60%
B. & R.....
West's Lock, Open and Shut Key.....50%
Star, Metal Plug, new list.....55%
Lockport, Metal Plug, reduced list.....60%
Metallic Key, Leather Lined.....60¢10%
Cork Lined.....60¢10%
Burnside's.....70¢5¢70¢10%
Burnside's Red Cedar, bbl. lots.....50¢10%
John Sommers.....
Peerless Best Block Tin Key.....40%
LXL, list quality, Cork Lined.....50%
Diamond Lock.....40%
Perfection, Fla. Red Cedar (in boxes) 40%
Cork Metal.....40%
Reliable Cork Lined.....80%
O. K. Western Pattern Cork Lined.....50%
No Brand, Red Cedar (in bbls.).....50¢10%
Western Pattern Metal Key.....40%
No Brand Metal Key.....60%
Self Measuring.....# doz., \$36.00.....20%
Lane's # doz., \$36.00.....25¢10%
Felice Plates—
See *Plates, Felice*.
Fibre Ware—See *Ware, Fibre*.
Fifth Wheels—
Derby and Cincinnati.....45¢5%
Brewster.....50¢5%
Files—
Domestic—
Nicholson Files, Rasps, &c. 60¢10¢5%
Nicholson (X.F.) Files.....60¢10¢10%
Nicholson's Royal Files (Seconds).....25%
(extra prices on certain sizes.)
American.....60¢10¢60¢10%
G. & H. Barnett (Black Diamond).....60¢10¢60¢10%
Arcade.....60¢10¢60¢10%
Eagle.....60¢10¢60¢10%
Other makers, best brand.....60¢10¢60¢10%
Fair brands.....70¢10¢70¢10%
Second quality.....80¢80%
Heller's Horse Rasps.....50¢7%40%
McCaffrey's Horse Rasps.....50¢10%
Chleoper Horse Rasps, Hand Cut.....50¢10%
Arcade Horse Rasps.....60¢10¢60¢10%
Trojan Horse Rasps.....60¢10%
Imported—
Butcher.....Butcher's list, 20%
Stubs.....Stubs' list, 25¢30%

Fixtures Grindstone—
Sargent's Patent.....70¢10%
Reading Hardware Co.....30¢10%
P. S. & W. Co.....50¢10%
Moore's.....55%
Fluting Machines—
See *Machines, Fluting*.
Fluting Scissors—
See *Scissors, Fluting*.
Fodder Squeezers—
See *Squeezers, Fodder*.
Forks—
Hay, Manure, &c. Asso. List, 70¢70¢5%
Hay, Manure, &c. Phila. List, 60¢60¢10%
Plated, see Spoons.
Frames—
Saw—
White Vermont.....# gro., \$9.00, \$10.00
Red, Polished and Varnished.....\$1.50, 25%
Screen, Window and Door—
Porter's Pat. Window and Door Frame.....33%40%
Warner's Screen Corner Irons.....33%40%
Stearns' Frames and Corners.....25¢25¢10%
Cortland.....40¢40%
Phillips' Window Screen Frames.....50%
Bonanza Window Screens.....50¢10%
Empire Fancy Screen Doors, # doz.....\$12
Freezers Ice Cream—
White Mountain.....60¢60%
Granite State.....65¢65%
Arcle.....70¢70%
American.....60%
Buffalo Champion.....65¢65%
Shepard's Lightning.....65¢65%
Gem.....65%
Blizzard.....70%
Double Action Crown.....60%
Crown.....60%
Star.....60%
Peerless.....60¢10%
Giant.....60%
Zero.....70%
Boss and Pel.....60¢10%
Keystone, P. D. & Co., each, \$1.50.....20%
Standard.....60¢60%
Standard Double Action.....60¢60%
Expert.....65¢65%
Model.....60¢60%
Confectioners' Machine.....50%
Fruit and Jelly Presses—
See *Presses, Fruit and Jelly*.
Fruit Pickers—
See *Pickers, Fruit*.
Fry Pans—See *Pans, Fry*.
Funnels—
Gersdorff's Perfection, Standard and
Globe, 7-in, 1 gro, 10¢; 2 to 5 gro,
20¢; 5 to 10 gr., 40¢
Copper, 1 to 6 doz, 15¢ 6 doz, 15¢
doz., 20¢; over 12 doz.....25%
Furnaces, Soldering—
Burgess No. 3 Gen. in Res., \$7.00
Burgess No. 3 Gen. Copper reservoir, \$8.50
Clayton & Lambert No. 1 Fire-Pot,
complete.....\$6.00
Fuse—Dis, 12¢15%
Common Hemp Fuse, for dry ground, \$2.70
Common Cotton Fuse, for dry ground 2.85
Single Taped Fuse, for wet ground, 3.85
Double Taped Fuse, for very wet gr., 4.80
Triple Taped Fuse, for very wet gr., 5.80
Small Gutta Percha Fuse, for water, 7.50
Large Gutta Percha Fuse, for water, 12.00
Gates Molasses—
Stebbin's Pattern.....80¢80%
Stebbin's Genuine.....60¢10%
Stebbin's Tinned Ends.....40%
Lincoln's Pattern.....70¢70%
Weed's.....20¢10%
Boss, # doz.:
No. 1, \$7; No. 2, \$8; No. 3, \$9; No. 4,
\$10.....60¢10%
Gauges—
Marking, Mortise, &c.....60¢10%
Starrett's Surface, Center and Scratch.....25¢10%
Stanley R. & L. Co.'s Butt and Rabbit
Gauge.....20¢10%
Barrett's Comb. Roller Gauge.....# doz \$8.00, \$8.50
Hoague & Peck's Champion Gauge—
With Scale.....# doz, \$5.00
Without Scale.....# doz, \$4.00
Wire, Wheeler, Rodden & Co.....10%
Wire, Morse's.....25%
Wire, Brown & Sharpe's.....10¢20%
Wire, P. S. & W. Co.....10¢10%
Gimlets—
Nail and Spike.....50¢10%
Eureka Gimlets.....60¢10%
Diamond Gimlets.....# gr \$5.00
Double Cut, Shepardson's.....45¢45%
Doub e Cut, Ives.....60¢60%
Double Cut, Douglass.....40¢10%
Glue—
Le Page's Liquid.....25¢25%
Upton's Liquid.....25%
Improved Process.....25%
Dodd's Liquid Glue.....25%
Glue Pots—See *Pots, Glue*.
Grease, Axle—
Fraser's.....Keg # 4, Pall # 1, 5¢
Fraser's, in boxes.....# gr \$5.50
Dixon's Everlasting, in bxs., # doz 1 m
\$1.20; 2 m \$2.00
Lower grades, special brands.....# gr \$5.50, \$7.00
Axleline, tin boxes.....# gross \$13.00
English Coach, wooden boxes.....# gross \$3.50
English Coach, 5-m tin pails, # doz \$3.50
Tiger, wooden boxes.....# gross \$7.00
Tiger, 5-m tin pails.....# doz \$3.50
Grindstones—
Family, regular list.....60%
Family, Cleveland Stone Co.....90%
Grindstone Fixtures—
See *Fixtures, Grindstone*.
Gun Powder—See *Powder*.
Hack Saws—See *Saws*.
Hafte, Awi—
Sewing, Brass Fer, # gr.....\$1.75
Pat. Sewing, Box, # doz.....45¢50%
Pat. Sewing, Long.....# doz \$1.50
Pat. Peg, Plain Top, # doz.....40%
Pat. Peg, Leather Top.....# doz \$5.50

Halters—

Cover's, Rope, Jute.....	60&10&10&25
Cover's Rope, 7-16-in. Jute.....	70&25
Cover's Rope, 3/4-in. Hemp.....	50&25
Cover's Ad. Rope, 3/4-in. Hemp.....	50&25
Cover's Hemp Horse and Cattle Tie.....	50&10&25
Cover's Jute Horse Ties.....	70&25
Cover's Jute Cattle Ties.....	70&10&25
Cover's Ad. Web Halters.....	35&25
Cover's Saddlery Works Halters.....	30&25
Cover's Saddlery Works Horse and Cattle Ties.....	30&25
Cover's Saddlery Works Handy Web Halters.....	33&25

Hammers—**Handled Hammers—**

Maydole's, list No. 1, 25.....	25&10&35
Buffalo Hammer Co.....	50&10
Hamson & Beckley.....	50&10
Atha Tool Co.....	50&10
Verre.....	40&10
C. Hammond & Son.....	40&10
Fayette R. Plumb.....	40&10
Artisans' Chisel, A. E. Nail.....	40&10
Regular Y. & E. A. Nail.....	50
Horseshoe Turning Hammers.....	50
Other Hammers.....	50&10
Cheney's Claw.....	40&10
Cheney's Machinist's & Riveting.....	50&25
Magnetic Tack, Nos. 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35, 36, 37, 38, 39, 40, 41, 42, 43, 44, 45, 46, 47, 48, 49, 50, 51, 52, 53, 54, 55, 56, 57, 58, 59, 60, 61, 62, 63, 64, 65, 66, 67, 68, 69, 70, 71, 72, 73, 74, 75, 76, 77, 78, 79, 80, 81, 82, 83, 84, 85, 86, 87, 88, 89, 90, 91, 92, 93, 94, 95, 96, 97, 98, 99, 100.....	1.75, 30&10
Nelson Tool Works.....	40&10
Warner & Nobles, new list.....	25&10
Peck, Stow & Wilcox.....	35&40
Sargent's.....	40&10

Heavy Hammers and Sledges—

3 lb and under.....	75&10&75&10
3 to 5 lb.....	85
Over 5 lb.....	85
Wilkinson's Smiths.....	10&11&7

Handcuffs and Leg Irons—

See Police Goods.

Handles—**Cross-Cut Saw Handles—**

Atkins, new list.....	40
Champion.....	15
Elly's Perfection.....	40, 35

Iron, Wrought or Cast—

Door or Thumb.....	
Nos. 1 2 3 4	
Per doz.....	1.00 1.08 1.35 1.50
Roggin's Latches.....	40
Bronze Iron Drop Latches.....	30
Jap'd Store Door Handles—Nuts, 1 lb; 2 lb; 3 lb; 4 lb; 5 lb; 6 lb; 7 lb; 8 lb; 9 lb; 10 lb; 11 lb; 12 lb; 13 lb; 14 lb; 15 lb; 16 lb; 17 lb; 18 lb; 19 lb; 20 lb; 21 lb; 22 lb; 23 lb; 24 lb; 25 lb; 26 lb; 27 lb; 28 lb; 29 lb; 30 lb; 31 lb; 32 lb; 33 lb; 34 lb; 35 lb; 36 lb; 37 lb; 38 lb; 39 lb; 40 lb; 41 lb; 42 lb; 43 lb; 44 lb; 45 lb; 46 lb; 47 lb; 48 lb; 49 lb; 50 lb; 51 lb; 52 lb; 53 lb; 54 lb; 55 lb; 56 lb; 57 lb; 58 lb; 59 lb; 60 lb; 61 lb; 62 lb; 63 lb; 64 lb; 65 lb; 66 lb; 67 lb; 68 lb; 69 lb; 70 lb; 71 lb; 72 lb; 73 lb; 74 lb; 75 lb; 76 lb; 77 lb; 78 lb; 79 lb; 80 lb; 81 lb; 82 lb; 83 lb; 84 lb; 85 lb; 86 lb; 87 lb; 88 lb; 89 lb; 90 lb; 91 lb; 92 lb; 93 lb; 94 lb; 95 lb; 96 lb; 97 lb; 98 lb; 99 lb; 100 lb.....	1.00 1.08 1.35 1.50
Bar Door, 1 lb; 2 lb; 3 lb; 4 lb; 5 lb; 6 lb; 7 lb; 8 lb; 9 lb; 10 lb; 11 lb; 12 lb; 13 lb; 14 lb; 15 lb; 16 lb; 17 lb; 18 lb; 19 lb; 20 lb; 21 lb; 22 lb; 23 lb; 24 lb; 25 lb; 26 lb; 27 lb; 28 lb; 29 lb; 30 lb; 31 lb; 32 lb; 33 lb; 34 lb; 35 lb; 36 lb; 37 lb; 38 lb; 39 lb; 40 lb; 41 lb; 42 lb; 43 lb; 44 lb; 45 lb; 46 lb; 47 lb; 48 lb; 49 lb; 50 lb; 51 lb; 52 lb; 53 lb; 54 lb; 55 lb; 56 lb; 57 lb; 58 lb; 59 lb; 60 lb; 61 lb; 62 lb; 63 lb; 64 lb; 65 lb; 66 lb; 67 lb; 68 lb; 69 lb; 70 lb; 71 lb; 72 lb; 73 lb; 74 lb; 75 lb; 76 lb; 77 lb; 78 lb; 79 lb; 80 lb; 81 lb; 82 lb; 83 lb; 84 lb; 85 lb; 86 lb; 87 lb; 88 lb; 89 lb; 90 lb; 91 lb; 92 lb; 93 lb; 94 lb; 95 lb; 96 lb; 97 lb; 98 lb; 99 lb; 100 lb.....	1.00 1.08 1.35 1.50
Chest and Lifting.....	70&70&10

Wood—

Saw and Plane.....	40&10&50
Hammer, Hatchet, Axe, &c.....	40&40&50
Brad-Awl.....	30
Hickory Firmer Chisel, ass'd.....	40
Hickory Firmer Chisel, large.....	50
Apple Firmer Chisel, ass'd.....	40
Apple Firmer Chisel, large.....	50
Socket Firmer Chisel, ass'd.....	40
Socket Framing Chisel, ass'd.....	40
J. B. Smith & Co.'s Pat. File.....	50
File, assorted.....	30
Auger, assorted.....	50
Auger, large.....	70
Pat. Auger.....	30&10
Pat. Auger, Douglas.....	30
Pat. Auger, Swan.....	30
Hoe, Rake, Shovel, &c.....	60&60&50

Hangers—

Bar Door, old patterns.....	70&70&50
Bar Door, New England.....	70&70&50
Samson Steel Anti-Friction.....	55
Orleans Steel.....	55
Hamilton Wrought Steel Track.....	55
Champion.....	60&10
Climax Anti-Friction.....	55
Zenith for Wood Track.....	55
Sterling.....	50&10&60
Victor, No. 1, \$15.00; No. 2, \$16.50; No. 3, \$18.00.....	60&25
Kliders.....	50&50&10
Bos.....	60&10&25
Best Anti-Friction.....	60&10&25
Duplex (Wood Track).....	60&10&25
Terry's Modern.....	50&10&50&10&50
Terry's Ideal.....	50&10&50&10&50
Terry's Solid.....	50&10&60
Terry's Shield.....	50&10&60
Terry's Wrought Single Strap.....	50&10
Cronk's Patent, Steel Covered.....	50&10
Carrier Steel Anti-Friction.....	50&10
Richards.....	30&30&10
Lane's New Standard.....	50&50&50
Lane's Standard.....	50&50&50&10
Lane's Parlor.....	40
Warner's Patent, Steel Covered.....	20&10&10
Stearns' Anti-Friction.....	20&10&10
Stearns' Challenge.....	25&10&10
Cincinnati Nos. 1, 2, 25; 3, 25; 4, 25.....	25
Paragon, Nos. 5, 5 1/2, 7 and 8.....	20&10
Crescent.....	60&60&10
Nickel, Steel, Nos. 0, 25; 1, 25; 2, 25.....	40&10&60
Chicago Anti-Friction.....	30&10
Star.....	40&10&40&50
Barry.....	50
Interstate.....	50&10&60
Pendulum, Payson's.....	40&40&10
Woody.....	45
Economy, \$6.00.....	50&10
Perfection.....	50&10&50&10&50
Lundy, Steel Parlor.....	40
Matchless.....	50&10
Wild West.....	45&10
Moore's Elevator.....	30
Moore's Baggage Car Door.....	30
Moore's Railroad.....	50

Harness Snaps—See Snaps.**Hatchets—**

American Axe and Tool Co.....	
Blood's.....	
Hunt's.....	
Hurd's.....	
Mann's.....	
Peck's.....	
Underhill's.....	40 & 10
Buffalo Hammer Co.....	@
Fayette R. Plumb.....	50&50
C. Hammond & Son.....	
Kelly's.....	
Sargent's & Co.....	
P. S. & W. Co.....	
Ten Eyck Edge Tool Co.....	
Collins.....	10
Schulte, Lohoff & Co.....	50&50&50

Hay and Straw Knives—

See Knives.

Hinges—**Blind Hinges—**

Parker.....	75&25
Huffer.....	50
Clark's, Nos. 1, 3, 5, 40 and 50.....	80&80&50
Clark's Mortise Gravity.....	50
Sargent's, Nos. 1, 3, 5, 11, 12, 13, 15, 17, 18, 19, 20, 21, 22, 23, 24, 25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35, 36, 37, 38, 39, 40, 41, 42, 43, 44, 45, 46, 47, 48, 49, 50, 51, 52, 53, 54, 55, 56, 57, 58, 59, 60, 61, 62, 63, 64, 65, 66, 67, 68, 69, 70, 71, 72, 73, 74, 75, 76, 77, 78, 79, 80, 81, 82, 83, 84, 85, 86, 87, 88, 89, 90, 91, 92, 93, 94, 95, 96, 97, 98, 99, 100.....	75&10&25
Shepard's.....	75&10&25
Noiseless.....	75&10
Niagara.....	80
Buffalo.....	80
Clark's Genuine Pattern.....	80
O. S., Lull & Porter.....	75&10
Queen City Reversible.....	70&10&50
Clark's, Lull & Porter, Nos. 0, 1, 1 1/2, 2, 2 1/2, 3.....	75&10&25
North's Automatic Blind Hinges, No. 2, for Wood, \$9.00; No. 3, for Brick, \$11.50.....	10

Gate Hinges—

Western.....	40
N. E.....	40
E. Reversible.....	40
Clark's, Nos. 1, 2, 3.....	40
Automatic.....	40
Shepard's.....	40

Spring Hinges—

Geer's Spring and Blank Butts.....	40
Union Spring Hinge Co.'s list.....	20
March.....	25
Barker's Double Acting.....	25
Union Mfg. Co.....	25
Bommer's.....	30
Buckman's.....	15&20
Chicago.....	30
Barclay's Patent Checking.....	15
Acme.....	15
U. S.....	25
Empire and Crown.....	20
Hero and Monarch.....	55
American, Gem and Star.....	20
Oxford.....	20
Royal.....	60
Reliable.....	60
No. 10 Matchless.....	60
No. 25 Unbreakable.....	60
J. G. C. Covered, \$30.....	50
Samson.....	60
Wiles, No. 1, \$16; No. 2, \$13.....	40
Devore, No. 1.....	40
Freeport.....	40
New Idea Nos. 1 and 10.....	40
New Idea Dbl. Acting.....	45
Ideal No. 3.....	40
Stearns' Noiseless Floor Hinge, \$ set.....	20

Wrought Iron Hinges—

List February 14, 1891.....	50&10&50&10&50
Strap and T.....	50&10&50&10&50
Corrugated Strap and T.....	50&10&50&10&50
Screw Hook and.....	6 to 12 in. \$ 3 1/2
Strap.....	22 to 36 in. \$ 4 1/2
Screw Hook and Eye.....	4 in. \$ 7 1/2 5 in. \$ 8 1/2 6 in. \$ 9 1/2
Roller Blind Hinges, Nos. 32 and 34.....	50&10
Roller Blind Hinges, Nos. 252 and 254.....	55&10
Roller Plate.....	70&10
Roller Raised.....	70&10
Plate Hinges { 8, 10 & 12 in. \$ 1 1/2 "Providence" { over 12 in. \$ 2 1/2	70&10

Brittan, Graham & Mathes, Hat Jan.
1890, 80¢10¢10¢
Plate, 33¢10¢25¢
Barnes Mfg. Co., 40¢10¢10¢
Yale, 33¢10¢25¢
Deitz Flat Key, 30¢
Bomer's Night Latches, 15¢
Brooklyn Latches, 50¢10¢
Warner's Burglar Proof, 7 doz. \$3.00, 50¢

Elevator—

Moore's, 33¢10¢

Padlocks—

List June 10, 1891, 50¢25¢
Norwich Lock Mfg. Co., old list, 50¢25¢
Yale Lock Mfg. Co.'s, net prices
Eureka, Eagle Lock Co., 40¢25¢
Bomer's Nos. 0 to 91, 30¢
Bomer's Scandinavian, &c., Nos. 100 to 505, 15¢
A. E. Deitz, 40¢
Champion Padlocks, 40¢
Hotchkiss, 30¢
Star, 30¢
Horneshoe, 7 doz. \$9.50, 50¢10¢
Barnes Mfg. Co., 40¢10¢10¢
Nock's, 30¢
Scandinavian, 90¢40¢
E. T. Fraim's Keystone Scandinavian, Nos. 119, 120, 130 and 140, 90¢10¢
Other Nos., 65¢
Ames Sword Co. up to No. 150, 40¢
Ames Sword Co. above No. 150, 50¢
Blaymaker, Barry & Co., No. 1010 line, 90¢5¢
No. 41 line, 50¢
No. 61 line, 60¢
No. 21 line, 30¢

Sash, &c.—

Clark's No. 1, \$10; No. 2, \$8 7 gr., 33¢10¢
Ferguson's, 33¢10¢
Victor, 60¢10¢25¢
Walker's, 25¢33¢10¢
Attwell Mfg. Co., 60¢10¢10¢
Beading, 25¢33¢10¢
Hammond's Window Springs, 40¢
Common Sense, Jap'd, Cop'd & Br'd, 40¢
Common Sense, Nickel Plated, 50¢10¢
Universal, 30¢
Kempshall's Gravity, 60¢
Kempshall's Model, 60¢10¢10¢
Corbin's Daisy, list Feb. 15, 1888, 70¢
Payson's Perfect, 60¢10¢10¢
Hugunin's Sash Balances, 25¢5¢25¢
Hugunin's New Sash Locks, 25¢5¢25¢
Eves Patent, 60¢10¢10¢
Fish (Liesche's pat.), No. 100, 7 gr., 5¢
No. 105, 7 gr., 10¢
Davis, Bronze, Barnes Mfg. Co., 60¢
Champion Safety list January, 1893, 70¢5¢
Security, 70¢
Hunt, list Jan., 1892, 70¢
Wolcott's, 60¢10¢5¢
Monarch, 60¢

Lumber Tools—

See Tools, Lumber.

Lustro—

Four-ounce bottles, 7 doz., \$1.75; 7 gross, \$17.00

Machines.

Boring—
Without Augers, Upright, Angular.
Douglas, 50¢10¢10¢
Buell's, Rice's Pat., 5.50 6.75, 40¢10¢10¢
Jennings', 5.50 6.75, 45¢10¢10¢
Other Machines, 2.35 2.75
Phillips' Patent, 7.00 7.50
Miller's Falls, 7.50 25¢

Fluting—
Knox, 4 1/2-inch Rolls, \$3.25 each, 35¢
Knox, 6-inch Rolls, \$3.60 each, 35¢
Knox, 8 1/2-inch Rolls, \$2.15, 35¢
Eagle, 6 1/2-inch Rolls, \$2.85, 35¢
Crown, 4 1/2 in., \$3.50; 6 in., \$4.00; 8 in., \$4.50 each, 35¢
Crown Jewel, 6 in., \$3.50 each, 35¢
American, 5 in., \$3.00; 6 in., \$3.40; 7 in., \$4.50 each, 35¢
Domestic Fluter, each, \$1.50
Geneva Hand Fluter, White Metal, 25¢
Crown Hand Fluter, No. 1, \$15.00; 2, \$12.50; 3, \$10.00, 4, \$8.25, 30¢
Shepard Hand Fluter, No. 85, per doz \$15.50, 40¢
Shepard Hand Fluter, No. 110, 7 doz \$11.00, 40¢
Shepard Hand Fluter, No. 95, 7 doz \$8.00, 40¢
Combined Fluter and Sad Iron, 7 doz \$5.00, 30¢

Holisting—
Moore's Hand Holst, with Lock Brake, 20¢
Moore's Anti-Friction Differential Pulley Block, 20¢
Moore's Rope Differential Pulley Block, 60¢
Energy Mfg. Co.'s, 25¢
See also Blocks.

Washing—
Anthony Wayne, 7 doz., No. 1, \$42; No. 2, \$36; No. 3, \$42.
Wayne American, 7 doz \$36.00
Western Star, 7 doz, No. 2, \$36; No. 3, \$39.
Wells, 7 doz \$54.00
Fair and Square, 7 doz \$42.00

Mallets—
Hickory, 20¢10¢20¢10¢10¢
Lignumvite, 20¢10¢20¢10¢10¢
B. & L. Block Co., Hickory & L. V., 50¢30¢10¢

Mattocks—Regular list,
60¢10¢60¢10¢25¢

Measures—
Standard Fiberware, No. 1, peck 7 dozen, \$3.50; 1/4 peck, \$3.00

Meat Cutters—
See Cutters, Meat.

Menders, Harness—
Per doz., \$2.00

Milk Cans—See Cans, Milk.

Mills—

Coffee—
Box and Side, list Jan. 1, 1888, 60¢10¢5¢
Net prices are often made which are lower than above discount.
American Enterprise Mfg. Co., list Jan. 17, 1893, 20¢
The Swift, Lane Bros., 30¢
Waddell's New Box Mills, Ideal Brand, New List, 60¢

Mincing Knives—
See Knives, Mincing.

Molasses Gates—
See Gates, Molasses.

Money Drawers—
See Drawers, Money.

Mowers, Lawn—
Best Machines: 10-in., \$4; 12-in., \$4.50; 14-in., \$5; 16 in., \$5.50; 18-in., \$6.
Low-Grade Machines:
10-in., \$3; 12-in., \$3.25 14-in., \$3.50 each

Muzzles—
Safety, 7 doz., \$3.00, 25¢

Nails.—
Cut and Wire, See Trade Report.
Wire Nails, Papered.
Association list, May 1, '92, 80¢10¢10¢5¢
Track Mfrs' list, 70¢5¢70¢10¢
Hungarian, Finishing, Upholsterers', &c. See Tasks.

Horse—
Nos. 6 7 8 9 10
American, 9 1/2 9 1/2 9 1/2 9 1/2 net
Ausable, 28¢ 26¢ 26¢ 24¢ 23¢
Clinton, Fin., 19¢ 17¢ 16¢ 15¢ 14¢ 40¢5¢25¢
Essex, 28¢ 26¢ 26¢ 24¢ 23¢ 40¢10¢50¢
Lyra, 19¢ 17¢ 16¢ 15¢ 14¢ 40¢5¢
Snowden, 19¢ 17¢ 16¢ 15¢ 14¢ 40¢5¢
Vulcan, 23¢ 21¢ 20¢ 19¢ 18¢ 25¢
Northwestern, 25¢ 23¢ 22¢ 21¢ 20¢ 25¢25¢5¢
A. C., 25¢ 23¢ 22¢ 21¢ 21¢ 25¢10¢33¢45¢5¢
C. B. K., 25¢ 23¢ 22¢ 21¢ 21¢ 33¢45¢10¢
Maud S., 25¢ 23¢ 22¢ 21¢ 21¢ 40¢10¢5¢
Champlain, 28¢ 26¢ 26¢ 24¢ 23¢ 40¢5¢5¢25¢
Saranac, 23¢ 21¢ 20¢ 19¢ 18¢ 40¢
Champion, 25¢ 23¢ 22¢ 21¢ 20¢ 10¢10¢10¢
Capewell, 19¢ 18¢ 17¢ 16¢ 16¢ 10¢5¢
Ancher, 23¢ 21¢ 20¢ 19¢ 18¢ 50¢
Western, 23¢ 21¢ 20¢ 19¢ 18¢ 50¢
Empire Bronzed, 19¢14¢ 7¢

Picture—
Brass Head, Sargent's list, 60¢10¢10¢
Brass Head, Combination list, 50¢10¢
Porcelain Head, Sargent's list, 50¢10¢10¢
Porcelain Head, Combination list, 40¢10¢
Niles' Patent, 40¢
Nail Pullers—See Pullers, Nail.
Nail Sets—See Sets, Nail.

Nut Crackers—
See Crackers, Nut.

Nuts—List Dec. 18, 1889.

Oakum—
Best or Government, 7 doz \$3.00, 25¢
U. S. Navy, 7 doz \$2.75, 30¢
Navy, 7 doz \$2.50, 30¢
Oil Tanks—See Tanks, Oil.
Oilers—
Zinc and Tin, 65¢10¢70¢5¢
Brass and Copper, 50¢10¢50¢10¢5¢
Malleable, Hammers' Improved, No. 1, \$3.60; No. 2, \$4.00; No. 3, \$4.40 10¢10¢5¢
Malleable, Hammers' Old Pattern, same list, 45¢
Prior's Pat. or "Paragon" Zinc, 60¢10¢10¢
Olmstead's Tin and Zinc, 60¢
Olmstead's Brass and Copper, 50¢
Broughton's Zinc, 60¢
Broughton's Brass, 60¢
Steel, Draper & Williams, 60¢

Openers, Can—
Messenger's Comet, 7 doz \$3.00, 25¢
American, 7 gross \$2.75, 30¢
Duplex, 7 doz 25¢, 15¢20¢
Lyman's, 7 doz \$3.75, 20¢
No. 4, French, 7 doz \$2.25, 55¢60¢
No. 4, Iron Handle, 7 gr \$3.00, 45¢60¢
Eureka, 7 doz \$2.50, 10¢
Sardine Scissors, 7 doz \$2.75, 30¢
Star, 7 doz \$2.75, 30¢
Sprague, No. 1, \$2.00; 2, \$2.25; 3, \$2.50; 60¢70¢
Excelsior, No. 1 \$2.50; No. 2, \$1.50, 40¢
World's Best, 7 gross, No. 1, \$12.00, 40¢
No. 2, \$24.00; No. 3, \$36.00, 50¢10¢
Universal, 7 doz \$3.00, 55¢65¢
Domestic, 7 doz \$2.00, 45¢
Champion, 7 doz \$2.00, 50¢
Moore's, 7 doz \$2.00, 50¢

Packing, Steam—
Rubber—
Standard, 70¢70¢10¢
N. Y. B. & P. Co., Standard, 60¢80¢5¢
N. Y. B. & P. Co., Empire, 60¢
N. Y. B. & P. Co., Salamander, 25¢
Jenkins' Standard, 7 doz \$8.00, 25¢5¢5¢

Miscellaneous—
American Packing, 10¢9¢11¢ 7¢
Italia Packing, 13¢14¢ 7¢
Cotton Packing, 15¢17¢ 7¢
Jr., 7¢

Pails—
Creamery—
S. S. & Co., 18-qt., \$7.00; 20-qt., \$7.25 per doz., 5¢

Galvanized—

Quarts 10 12 14
Hill's Light Weight, 7 doz. \$2.75 3.00 3.25
Hill's Heavy Weight, 7 doz. 3.00 3.25 3.50
Helwig's, 2.50 2.75 3.00
Sidney Shepard & Co., 2.50 2.75 3.00
Iron Clad, 2.50 2.75 3.00
Fire Buckets, 2.75 3.25 3.50
Buckets—See Well Buckets.

Indurated Fiber Ware—25¢
Star Pails, 12 qt., 7 doz. \$4.20
Milk, 14 qt., 7 doz \$5.40
Stable, 14 qt., 7 doz \$6.00
Fire Pails, deep, 7 doz \$4.80
Fire Pails, round bottom, 7 doz \$5.40

Standard Fiber Ware—
Water Pails, 12 qt., 7 doz. \$3.60 4.00
Dairy Pails, 14 qt., 7 doz. 4.00 4.50
Fire Pails, No. 1, 12 qt., 7 doz 4.00
Fire Pails, No. 2, 14 qt., 7 doz 4.50
Sugar Pails, 5.50 6.00
Horse Pails, 4.50
Buggy Pails, 3.50
Saw Vars (app), 7 doz 5.50
Chamber Pails, 14 qt., 6.00 7.00

Pans—Dripping—
Small sizes, 7 doz. \$5.4¢
Large sizes, 7 doz. 6¢
Silver & Co. (Covered), 40¢

Fry—
Standard List:
No., 0 1 2 3 4 5
7 doz. \$3.00 \$3.75 \$4.25 4.75 \$5.25
No., 5 6 7 8 9
Polished, regular goods, 7 doz. \$6.00 \$7.00 \$8.00 \$9.00
Acme Fry Pans, 7 doz. 75¢75¢10¢60¢45¢

Dust—
Steel Edge, No. 1, 7 doz \$1.75

Roasting and Baking—
Columbian S. S. & Co.: Nos. 10, \$2; 20, \$2.25; 30, \$2.50 each, 60¢10¢

Paper and Cloth—
Sand and Emery—
List April 19, 1888, 50¢10¢50¢10¢10¢
Sibley's Emery and Crocus Cloth, 30¢

Parers—Apple—
Advance, 7 doz \$4.75
Baldwin, 7 doz 5.25
Bonanza, each 5.00
Daisy, 7 doz 4.00
Dandy, each 7.50
Eclipse, 7 doz 4.25
Eureka, 18¢ each 16.00
Family Bay State, 7 doz 12.00
Favorite, 7 doz 6.00
Gold Medal, 7 doz 4.00
Ideal, 7 doz 4.00
Improved Bay State, 7 doz 27.00, 80.00
Little Star, 7 doz 4.50
Monarch, 7 doz 15.50
New Lightning, 7 doz 5.50
Orion, 7 doz 4.00
Penn, 7 doz 4.00
Perfection, 7 doz 4.00
Pomona, 7 doz 4.00
Mocking Table, 7 doz 6.00
Turn tab, 7 doz 4.50
Victor, 7 doz 13.50
Vavely, 7 doz 4.00
White Mountain, 7 doz 4.00
72, 7 doz 4.25
78, 7 doz 7.00

Potato—
White Mountain, 7 doz \$4.50
Antrim Combination, 7 doz \$5.50
Hoosier, 7 doz \$13.50
Sarotoga, 7 doz \$5.50

Pencils—
Faber's Carpenters', high list 50¢
Faber's Round Gilt, 7 doz \$5.25
Dixon's Lead, 7 doz \$4.50
Dixon's Lumber, 7 doz \$6.75
Dixon's Carpenters', 10¢

Pencils, Soapstone—
See Crayons.

Pickers, Fruit—
Prize Fruit Pickers, 50¢

Picks—
Railroad or Adze Eye, 5 to 6, \$12.00; 6 to 7, \$13.00, 60¢10¢60¢10¢10¢

Picture Nails—
See Nails, Picture.

Pinking Irons—
See Irons, Pinking.

Pins—
Humason, Beckley & Co.'s, 60¢10¢
Sargent & Co.'s, \$17 and \$18, 60¢10¢
Peck, Stow & W. Co., 50¢10¢50¢10¢5¢

Curtain—
Silvered Glass, net
White Enamel, net

Escutcheon—
Iron, list Nov. 11, 1885, 50¢10¢50¢10¢5¢
Brass, 60¢60¢5¢

Pipe, Wrought Iron—
List April 13, 1893.
1 1/2 and under, Plain, 57¢10¢
1 1/2 and under, Galv., 60¢10¢
1 1/2 and over, Plain, 67¢10¢
1 1/2 and over, Galv., 67¢10¢
Boiler Tubes, list Oct. 24, 1892, 68¢10¢
Casing, list Nov. 16, 1892, 52¢10¢
Inserted joints Casing, list Nov. 16, 1892, 47¢10¢
Steel Boiler Tubes, 27¢10¢
Cold Drawn Seamless Steel Tubing, 50¢

Planes and Plane Irons—
Wood Planes—
Molding, 40¢40¢10¢
Bench, First quality, 45¢45¢10¢
Bench, Second quality, 50¢50¢10¢
Bailey's (Stanley R. & L. Co.), 50¢10¢
Bailey's (Stanley R. & L. Co.), 50¢10¢
Miscellaneous Planes (Stanley R. & L. Co.), 25¢10¢
Steele's Iron Planes, 60¢50¢5¢
Meriden Mal. Iron Co.'s, 50¢50¢5¢
Davis' Iron Planes, 50¢50¢5¢
Birmingham Plane Co., 60¢80¢5¢
Gage Tool Co.'s Self-Setting, 20¢10¢10¢
Chaplin's Iron Planes, 50¢50¢5¢
Sargent's, 60¢50¢10¢
Standard Tool Co., 50¢50¢5¢

Plane Irons—
Butcher's, \$5.00 to \$5.25 to 4
Buck Bros., 80¢

Auburn Thistle, 30¢10¢
Ohio, 30¢10¢
Sandusky, 30¢10¢
L. & J. White, 30¢10¢
Stanley R. & L. Co., 60¢10¢

Plates—
Felloe, 7 doz \$4.00, 45¢

Pliers and Nippers—
Button's Patent, 60¢
Hall's No. 2, 5 in., \$13.50; No. 4, 7 in., \$21.00 7 doz
Humason & Beckley Mfg. Co., 50¢50¢10¢
Lindsay's Giant, 38¢10¢
Gas Pliers, 60¢
Gas Pliers, Custar's Nickel Plated, 60¢25¢
Eureka Pliers and Nippers, 40¢
Russell's Parallel, 25¢
P. S. & W. Cast Steel, 40¢10¢
P. S. & W. Timmers' Cutting Nippers, add 6¢, 10¢
Carew's Pat. Wire Cutters, 30¢
Morrill's Parallel, 7 doz, \$12.00, 30¢25¢
Cronk's 8 in., \$15.00; 10 in., 40¢
Cronk's Button Pattern, 50¢10¢50¢
Cronk's Carrier Pliers, 60¢10¢50¢

Plumbs and Levels—
Regular List, 75¢10¢75¢10¢25¢
Stanley's Duplex, 20¢10¢
Stanley's Handy, 20¢10¢
Diston's, 40¢
Cook's, 40¢10¢
Pocket Level, 70¢10¢70¢10¢10¢
Davis Iron Levels, 30¢
Davis Incliniometers, 10¢10¢

Poachers, Egg—
Buffalo Steam Egg Poachers, 7 doz, \$3.45
No. 1, \$6.00; No. 2, \$9.00, 33¢10¢
Silver & Co., 6-Ring, 7 doz, \$4.00; 5-Ring, 50¢

Pokes, Animal—
Bishop's I. X. L., 7 doz \$8.00
Bishop's Monarch, 7 doz \$4.50
Bishop's Pioneer, 7 doz \$4.00
Bishop's American, 7 doz \$3.00
Eagle, Double Stale, 7 doz \$5.75
Eagle, Single Stale, 7 doz \$3.75
Buckeye, Single Stale, 7 doz \$2.75
Bolding, 7 doz \$6.00
Metallic Horse Poke, 7 doz, \$6.00

Police Goods—
R. I. Tool Co., Handcuffs, \$15.00 7 doz 10¢
R. I. Tool Co., Leg Irons, \$25.00 7 doz 10¢
Tower's, 35¢
Dixey's Improved Handcuffs, 2 Handcuffs, Polished, 7 doz, \$48.00, Nickelated, \$57.00; 3 hands, Polished, 7 doz, \$72.00; Nickelated, \$84.00, 25¢
J. P. Lovell's Police Goods, 25¢

Polish—Metal—
Prestoline, 30¢
Prestoline Paste, 33¢10¢
Gaston's Silver Compound, 33¢10¢

Stove—
Joseph Dixon's, 7 gro, \$6.00, 10¢
Gem, 7 gro, \$4.50, 10¢
Gold Medal, 7 gro, \$6.00, 25¢
Lustro, 7 gro, \$4.75
Ruby, 7 gro, \$5.75
Rising Sun, 5 gro lots, 7 gro \$5.54
Dixon's Plumbago, 7 gro \$4.50
Boynton's Noon Day, 7 gro \$13.00
Parlor Pride Stove Enamel, 7 gro
Yates' Liquid, 2 3/4 5 10 gal
Yates' gal., \$0.50 70 100 150

**Yates Standard Paste Polish, 10 doz cans, 12¢10¢
Jet Black, 7 doz \$5.50
Japanese, 7 gro \$3.50
Kreside, 7 gro \$3.50
Diamond O. K. Enamel, 7 gro \$19.00
Bonnell's Liquid Stove Polish, 7 gro \$6.00
Bonnell's Paste Stove Polish, 7 gro \$6.00
Black Eagle Benzine Paste, 5 and 10 lb cans, 12¢10¢
Black Jack Water Paste, 5 and 10 lb cans, 12¢10¢
Nickel Plate Paste, 7 gro \$6.00
Crown Paste, 7 gro \$7.50
Crown Paste in 5 and 10 lb pails, 7 doz \$13¢
Black Flag, 5 and 10 lb pails, 7 gro \$7.90
Black Flag, liquid, in bottles, 7 gro \$8.00
Diamond Rock Nickel Cleaner, 7 gro \$10.90**

**Raven Liquid, 6 oz. bottles, 7 gro \$3.00
Raven Liquid, 8 oz. bottles, 7 gro \$3.00
Raven Water Polish, large boxes, 7 gro \$7.20
Raven Paste (6 pails), 7 doz 10¢**

Poppers, Corn—
Round or Square, 1 qt., 7 doz \$1.00; 7 gr \$3.00
1 1/2 qt., 7 doz \$1.00; 7 gr \$9.00
2 qt., 7 doz \$1.50; 7 gr \$14.00

Post Hole and Tree Augers and Diggers—
See Diggers, Post Hole, &c.

Potato Parers—
See Parers, Potato.

Pots—Glue—
Tinned, 40¢10¢40¢10¢10¢
Enamelled, 40¢10¢40¢10¢10¢
Family, Howe's "Eureka", 40¢
Family, L. F. C.'s "Handy", 50¢

Powder—
In Canisters—
Pine Sporting, 1 lb each, 0.90
Duck, 1 lb each, .80
Rifle, 1 lb each, .30
Rifle, 1/2 lb each, .18

In Kegs—
Rifle, 25-lb kegs, \$3.50
Rifle, 12 1/2-lb kegs, 2.00
Rifle, 9 1/2-lb kegs, .80
Duck, 25-lb kegs, 11.00
Duck, 12 1/2-lb kegs, 6.75
Duck, 9 1/2-lb kegs, 3.00

Presses—
Fruit and Jelly—
Interprise Mfg. Co., 25¢
Jennings, 7 doz \$3.50
Shepard's Queen City, 40¢
Silver & Co., 7 doz \$2.75

Pruning Hooks and Shears—See Shears.

Pullers, Nail—

Scranton..... doz., \$18.00, 39¢
 Giant, No. 1..... doz., \$18.00, 10¢
 Giant, No. 2..... doz., \$18.00, 10¢
 Pelican..... doz., \$20.00, 25¢
 Eclipse..... Each, \$2.00, net
 Economy..... doz., \$3.00

Pulleys—

Hot House, Awning, &c..... 60¢/70¢
 Japanned Screw..... 60¢/10¢
 Japanned Side..... 60¢/10¢
 Moore's Side, Anti-Friction..... 50¢
 Moore's Ceiling or End, Anti-Friction..... 50¢
 Moore's Dumb Waiter, Anti-Friction..... 50¢
 Moore's Electric Light..... 33¢/45¢
 Japanned Clothes Line..... 60¢/10¢
 Hay Fork, Solid Eye, 50¢/10¢
 Hay Fork, "Anti-Friction," 5 in. solid, \$4.50
 Hay Fork, "F" Common and Patent Bushed..... 50¢
 Hay Fork, Tarbox Pat. Iron..... 20¢
 Hay Fork, Reed's Self-Lubricating..... 40¢
 Hay Fork, Moore's Anti-Friction 5 in. Wheel, No. 2, \$12.00
 Shade Rack..... 45¢
 Tackle Blocks—See Blocks.
 Shepard's Niagara, No. 25, doz 23¢ net
 Nash (Auger Mortise).
 Common Sense..... 60¢
 Empire..... 80¢
 Ideal, Nos. 2, 10 & 15 } 90¢ less 1¢
 Acme..... } doz net.
 Star..... }
 On bbl. lots extra 5%
 Ideal, Nos. 25 and 55..... doz. 22¢ net.

Pumps—

Ostern, Best Makers..... 60¢/60¢
 Fitcher Spout, Best Makers..... 67¢/70¢
 Fitcher Spout, Cheaper G'ds..... 75¢/75¢

Punches—

Saddler's or Drive, good..... doz., 60¢/65¢
 Bemis & Call Co.'s Cast Steel Drive..... 50¢/55¢
 Bemis & Call Co.'s Springfield Socket..... 65¢
 Spring, good quality..... doz., \$2.50/\$2.80
 Spring, Leach's Pat..... 50¢/55¢
 Bemis & Call Co.'s Spring..... 50¢/55¢
 Bemis & Call Co.'s Check..... 55¢
 Solid Timmers, P., S. & W. Co., doz., \$1.44
 Timmers' Hollow Punches, P., S. & W. Co., 20¢/25¢
 Rice Hand Punch..... 15¢
 A very Revolving..... 40¢
 A very Sawsset and Punch—See Sawsset
 Niagara Hollow Punches..... 20¢/25¢
 Niagara Solid Punches..... 55¢

Rail—

Sliding Door, Wrt Brass..... 35¢, 40¢
 Sliding Door, Bronzed Wrt Iron..... 7¢
 Sliding Door, Iron, Painted..... 4¢, 4¢
 Barn Door, Light, In..... 3¢
 Per 100 feet..... \$2.00 2.50 3.10, 10¢
 B. D. for N. E. Hangers—
 Small. Med. Large.
 Per 100 feet..... \$3.15 2.70 3.25 Net

Terry's Steel Rail..... 7¢, 4¢
 Victor Track Rail, 7¢ foot..... 60¢/25¢
 Carrier, double braced, Steel Rail, 7¢ foot..... 30¢/45¢
 Lundy Parlor Door, Planed Edge, 7¢ ft..... 25¢/10¢
 Moore's Steel Rail..... 7¢, 5¢

Rakes—

Cast Steel, Association G'ds..... 70¢/70¢/52¢
 Cast Steel, outside G'ds..... 70¢/70¢/52¢
 Malleable..... 70¢/70¢/52¢
 Gibbs' Lawn Rake..... doz., \$4.90
 Gibbs' Canton Lawn Rake..... doz., \$3.75
 Gibbs' Acme Lawn Rake..... doz., \$4.75
 Gibbs' Favorite Lawn Rake..... doz., \$3.90
 Gibbs' Crown Lawn Rake, No. 1..... doz., \$4.90; No. 2, \$5.40
 Onelda Lawn Rake..... doz., \$6.00
 Fort Madison Prize Bow Brace and Feeder..... 65¢
 Fort Madison Steel Tooth Lawn Rake..... \$6.00

Razors—

J. R. Torrey Razor Co..... 20¢
 Wostenholm and Butcher, \$10 to £..... 10¢
 Jordan's A. & L. new list..... Net
 Jordan's Old Faithful, new list..... Net
 Galvanic..... doz., \$15.00
 Electric Cutlery Co..... Net
 Campbell Cutlery Co..... 50¢

Razor Straps—**See Straps, Razor.****Registers—**

Moore's Japanned..... 75¢
 Moore's Electroplated..... 75¢
 Moore's Bronze Flutings..... 70¢
 Moore's Solid Bronze..... 65¢
 Moore's Stove Pipe..... 33¢

Rings and Ringers—**Bull Rings—**

Union Nut Co..... 55¢
 Sargent's..... 75¢/10¢
 Hookless low list..... 30¢
 Humason, Beckley & Co.'s..... 70¢/10¢
 Peck, Stow & W. Co.'s..... 50¢/10¢/50¢/10¢
 Ehrlich Hdw. Co., White Metal, low list..... 50¢/50¢/10¢

Hog—

Top of the Hill Ringers..... doz \$2.00
 Top of the Hill Ringers..... doz \$1.25
 Hill's Improved Ringers..... doz \$1.25
 Hill's Old Style Ringers..... doz \$1.12¢
 Hill's Tongs..... doz \$3.00
 Hill's Rings..... doz bxs \$1.00
 Perfect Rings..... doz \$1.50
 Perfect Rings..... doz \$2.15
 Blair's Hog Ringers..... doz \$2.00
 Blair's Hog Ringers..... doz \$2.00
 Champion Ringers..... doz \$2.00
 Champion Ringers, Double..... doz \$2.25
 Brown's Ringers..... doz \$2.00
 Brown's Ringers..... doz \$1.60
 Electric Hog Ringers..... doz \$2.00
 Electric Hog Ringers..... doz \$2.00
 Major Rings..... doz \$1.25
 Major Rings..... doz \$2.00

Rivets and Burrs—

Norway Iron list Nov. 17, '87..... 60¢/10¢
 Second quality..... 70¢
 Copper..... 60¢/60¢/10¢
 Coppered Iron, Bettina Brand..... 60¢/55¢

Rivet Sets—See Sets.**Roasting and Baking Pans—See Pans, Roasting and Baking.****Rods—**

stair, Brass..... 25¢/80¢
 stair, Black Walnut..... doz 40¢

Rollers—

Barn Door, Sargent's list..... 60¢/10¢/10¢
 Acme Moore's Anti-Friction..... 50¢
 Union Barn Door Roller..... 70¢
 Moore's Barn Door Stay..... 50¢
 Thompson Mfg. Co.'s Lawn Rollers..... 30¢

Rope—The following prices are f. o. b. New York or factory, and are shaded

on large lots; terms, 1½% for cash.
 Manila, 7-16 in. diam. and larger..... 8 9/16¢
 Manila, 1/4 and 5-16 in. 10 1/4¢
 Manila, Tarred Rope..... 8 1/4¢
 Manila, Hay Rope..... 8 1/4¢
 Sisal..... 7-16 inch and larger..... 7 1/2¢
 Sisal..... 3/8 in. 8 1/4¢
 Sisal..... 1/2 and 5-16 in. 8 1/4¢
 Sisal, Hay Rope..... 7 1/2¢
 Sisal, Tarred Rope..... 7 1/2¢
 Sisal, Medium Lath Yarn..... 7 1/2¢
 New Zealand, 7-16 in. & larger..... 7 1/2¢
 New Zealand..... 3/8 in. 7 1/2¢
 New Zealand..... 1/2 and 5-16 in. 7 1/2¢
 New Zealand, Hay Rope..... 8 1/4¢
 New Zealand, Tarred Rope..... 8 1/4¢
 Cotton Rope..... 13 1/4¢
 Jute Rope..... 6 1/2¢

Wire—

List February, 1892. All kinds..... 45¢

Rules—

Boxwood..... 30¢/10¢/10¢/30¢/10¢/10¢
 Ivory..... 50¢/10¢
 Starrett's Steel Rules and Straight Edges..... 25¢/10¢

Sad Irons—See Irons, Sad.**Sand and Emery Paper****and Cloth—****See Paper and Cloth.****Sash Cord—See Cord, Sash.****Sash Locks—See Locks, Sash.****Sash Weights—****See Weights, Sash.****Sausage Stuffers or Fillers—See Stuffers or Fillers, Sausage.****Saws—**

Disston's Circular..... 45¢/45¢/55¢
 Disston's Cross Cut, list Jan. 1, '93, 40¢/10¢
 Disston's Hand..... 25¢
 Woodrough & McParlin.
 Hand, Panel and Rip..... 25¢/10¢
 Cross Cuts, list Jan. 1, 1893..... 45¢/10¢
 Wheeler, Madden & Clemson Mfg. Co.
 Hand, Panel and Rip..... 30¢/10¢
 Cross Cuts, list Jan. 1, 1893..... 45¢/10¢
 Atkins' Circular..... 50¢/10¢
 Atkins' Cross Cuts, new list..... 40¢
 Atkins' Mulay, Mill and Drag..... 50¢/10¢
 Atkins' One-Man Saw..... 40¢
 Atkins' Wood Saws..... 40¢
 Peace Circular and Mill..... 45¢/45¢/55¢
 Peace Hand Panel and Rip..... 25¢/25¢/55¢
 Peace Cross Cuts, list Jan. 1, '93..... 45¢/10¢
 Richardson's Circular and Mill..... 45¢/45¢/55¢
 Richardson's X Cuts, list Jan. 1, '93, 45¢/10¢
 Richardson's Hand, &c..... 25¢/25¢/55¢
 C. E. Jennings & Co.'s brand..... 25¢

Hack Saws—

Griffin's, complete..... 40¢/10¢/50¢
 Griffin's Hack Saw Blades..... 40¢/10¢/50¢
 Star Hack Saws and Blades..... 25¢
 Eureka and Crescent..... 25¢

Scroll—

Lester, complete, \$10.00..... 25¢
 Rogers, complete, \$4.00..... 25¢
 Barnes' Builders' and Cab Makers'..... \$15.25
 Barnes' Scroll Saw Blades..... 35¢

Saw Frames—**See Frames, Saw.****Saw Sets—See Sets, Saw.****Saw Tools—See Tools, Saw.****Scales—**

Hatch, Counter, No. 171, good quality..... doz \$18.00/\$19.00
 Hatch, Tea, No. 161..... doz \$6.50/\$7.00
 Union Platform, Plain..... \$2.10/\$2.20
 Union Platform, Striped..... \$2.40/\$2.50
 Chaitillon's Grocers' Trip Scales..... 25¢
 Chaitillon's Eureka..... 25¢
 Chaitillon's Favorite..... 40¢
 Family Turnbills..... 30¢/30¢/10¢
 Riehle Bros' Platform..... 40¢

Scale Beams—**See Beams, Scale.****Scissors, Fluting..... 45¢****Scrapers—**

Adjustable Box Scraper (S. R. & L. Co.)
 \$6.00..... 30¢/10¢
 Box, 1 Handle..... doz \$2.25/\$2.50
 Box, 2 Handle..... doz \$3.00/\$3.25
 Dance Box and Ship..... 50¢/10¢/50¢
 Ship, Common..... doz \$3.50 net
 Ship, R. I. Tool Co..... 10¢

Screen Window and Door**Frames—See Frames****Screw Drivers—****See Drivers, Screw****Screws—****Bench and Hand—**

Bench, Iron..... 55¢/10¢/55¢/10¢/10¢
 Bench, Wood, Beech..... doz \$2.25
 Bench, Wood, Hickory..... 20¢/10¢
 Hand, Wood..... 25¢/10¢/25¢/10¢/55¢
 Hand, Grand Rapids, list..... 35¢

Coach, Lag and Hand-Rail—

Lag, Blunt Point, list Jan. 1, 1890..... 80¢/30¢/10¢
 Coach and Lag, Gimlet Point, list Jan. 1, 1890..... 80¢/30¢/10¢
 Hand Rail, Sargent's..... 70¢/10¢
 Hand Rail, H. & B. Mfg. Co..... 70¢/10¢/75¢
 Hand Rail, Am. Screw Co..... 75¢

Jack Screws—

Jack Screws, Millers Falls list..... 50¢/50¢/10¢
 Jack Screws, P., S. & W..... 35¢
 Jack Screws, Sargent..... 70¢
 Jack Screws, Stearns..... 40¢/40¢/10¢

Cork—

Humason & Beckley Mfg. Co..... 40¢/10¢/50¢
 Williamson's..... 33¢/33¢/45¢
 Detroit Cork Screw Co..... 33¢/45¢

Machine—

Flat Head Iron..... 65¢
 Round Head Iron..... 60¢

Wood—

List January 1, 1891.
 Flat Head Iron..... 70¢
 Round Head Iron..... 65¢
 Flat Head Brass..... 70¢
 Round Head Brass..... 65¢
 Flat Head Bronze..... 70¢
 Round Head, Bronze..... 65¢
 Rogers' Drive Screws..... 32¢/45¢

Scroll Saws—See Saws, Scroll.**Scythes—**

Grain..... 40¢/50¢/40¢/10¢
 Grass..... 40¢/10¢/50¢

Scythe Snaths—**See Snaths, Scythe.****Sets—**

Aiken's Sets, A. W. and Tools, No. 20, doz \$10.00..... 60¢/60¢/55¢
 Fray's Adj. Tool Hdl., Nos. 1, \$12; 2, \$18; 3, \$12; 4, \$9..... 45¢
 Millers Falls A. J. Tool Hdl., Nos. 1, \$12; 2, \$18..... 25¢
 Henry's Combination Haft..... doz \$6.50
 Stanley's Excelsior..... No. 1, \$7.50; No. 2, \$4.00; No. 3, \$5.50..... 30¢/10¢
 Common Broad Sets, No. 42, \$10.50; No. 43, \$12.50..... 70¢/10¢/55¢

Nail—

Square..... gr. \$4.00/\$4.25
 Round..... gr. \$3.25
 Buck Bros..... 27¢/45¢
 Cannon's Diamond Point..... gr. \$12, 20¢

Rivet—

Regular list..... 70¢

Saw—

Stillman's Genuine..... doz \$5.00/\$7.75, 40¢/55¢
 Stillman's Pattern, Hand, doz \$3.25;
 Cross Cut, \$6.50..... 55¢/55¢/10¢
 Common Lever..... doz \$2.00, 40¢/50¢
 Morrill's No. 1, \$15.00..... 40¢/20¢
 No. 11, \$16.00..... 40¢/20¢
 No. 3 and 4, \$25.00, \$23.00..... 40¢/20¢
 No. 5, Mill, \$31.00..... 40¢/20¢
 No. 10, \$15.50..... 40¢/20¢
 Leach's, No. 0, \$8.00; No. 1, \$15..... 16¢/20¢
 Nash's..... 20¢/10¢/20¢/10¢/10¢
 Hammer, Hotchkiss..... \$5.50, 10¢
 Hammer, Bemis & Call Co.'s new Pat. 45¢
 Bemis & Call Spring Hammer..... 30¢/55¢
 Bemis & Call Co.'s Cross Cut..... 20¢
 Aiken's Genuine..... \$13.00, 55¢/55¢/10¢
 Aiken's Imitation..... \$9.00, 55¢/55¢/10¢
 Hart's Pat. Lever..... 20¢
 Diction's Star..... 25¢
 Leopold..... 40¢/10¢/50¢
 Atkin's Lever..... doz No. 1, \$8.00
 Atkin's Criterion..... doz No. 1, \$6.00
 Croissant (Keller), No. 1, \$15.00; No. 2, \$24.00..... 40¢/10¢/50¢
 Avery's Saw Set and Punch..... 50¢
 Diction's Star..... doz \$7.00
 Kohler's Giant Royal..... doz \$12.00
 Crescent..... doz \$3.00
 Lloyd's Acme..... doz \$15, 40¢/10¢
 Taintor Positive..... doz \$18, 50¢

Sharpeners, Knife—

Applewood Handles..... doz \$6.00, 40¢
 Rosewood or Cocobola..... doz \$9.00 40¢

Shaves, Spoke—

Iron..... 45¢
 Wood..... 30¢
 Bailey's (Stanley R. & L. Co.)..... 40¢/10¢
 Stearns'..... 30¢/10¢
 Cincinnati..... 25¢/10¢
 Goodell's..... doz \$9.00..... 25¢

Shears—

American (Cast) Iron..... 75¢/10¢/75¢/10¢/55¢
 Barnard's Lamp Trimmers..... doz \$3.75
 Seymour's, List Dec. 1881..... 60¢/10¢/10¢/60¢/10¢/55¢
 Heinisch's, List Dec. 1881..... 30¢/40¢/10¢/60¢/10¢/55¢
 Heinisch's Tailor's Shears..... 33¢/45¢
 Cast Steel Trimmers:
 First quality..... 80¢/80¢/10¢
 Second quality..... 80¢/10¢/80¢/10¢/10¢
 Acme Cast Shears..... 10¢/10¢
 Diamond Cast Shears..... 10¢
 Victor Cast Shears..... 75¢/10¢/75¢/10¢/55¢
 Howe Bros. & Hulbert, Solid Forged Steel..... 40¢
 Hatch Cutlery Co., Solid Steel Forged..... 60¢/60¢/10¢
 Davenport Cutlery Co..... 60¢/60¢/10¢
 Clauss brand, Japanned..... 70¢
 Clauss brand, Nickel-plated, same list..... 60¢
 Galvanic 3/4 to 9 in., doz \$1.00 1/2 inch
 Electric Cutlery Co..... Net
 Campbell Cutlery Co., Jap'd..... 75¢
 Nickel Plated..... 65¢

Timmers' Snips—

Wrt. Handles, Steel Blades..... 20¢/20¢/10¢
 Niagara Snips and Shears..... 20¢/10¢
 Cast Handles, Laid with Steel..... 4¢

Pruning Shears and Hook

Disston's Combined Pruning Hook and Saw..... doz \$18.00, 20¢/10¢
 Disston's Pruning Hook..... doz \$12.00, 20¢/10¢
 E. S. Lee & Co.'s Pruning Tools..... 50¢/10¢/70¢
 Pruning Shears, Henry's Pat., doz..... \$3.75/\$4.50
 Henry's Pruning Shears..... doz \$4.50

Wheeler, M. & C. Co., Combination

doz \$12.00
 Dunlap's Saw and Chisel..... doz \$8.50, 30¢
 J. Mallinson & Co., No. 1, \$5.25; No. 2, \$7.25
 P., S. & W. Co..... 60¢
 Levin Pruner No. 1, \$15.00; doz 40¢/25¢
 Levin Pruner No. 2, \$21.00; doz 40¢/25¢

Timmers', &c.—

Shears and Snips (P. S. & W.)..... 20¢/25¢
 Snips, J. Mallinson & Co..... 33¢/45¢

Sheaves—**Sliding Door—**

M. W. Co., list July 1888..... 50¢/10¢/60¢/55¢
 R. & E., list Dec. 18, 1885..... 60¢/10¢/55¢
 Corbin's list..... 60¢/10¢/55¢
 Patent Roller..... 60¢/10¢/55¢
 Patent Roller, Hatfield's..... 75¢
 Russell's Anti-Friction, list Dec. 18, 1885..... 60¢/25¢
 Moore's Anti-Friction..... 50¢

Sliding Shutter—

R. & E., list Dec. 18, 1885..... 60¢/10¢/55¢
 Sargent's list..... 60¢/10¢/55¢
 Reading list..... 60¢/10¢/10¢

Shells—

First quality 4, 8, 10 and 12 gauge..... 25¢/10¢/33¢
 First quality Rival, Club and Climax brands, 14, 16 and 20 gauge (7¢/50¢ list)..... 20¢/10¢/33¢
 Prize..... 20¢/10¢/33¢
 Star, Club, Rival and Climax Brands..... 33¢/45¢/10¢/33¢
 Smokeless brand, 12, 10, 16 gauge..... 33¢/45¢/10¢/33¢
 Trap brand, 12 and 10 gauge..... 33¢/45¢/10¢/33¢
 Schold's Comb. Shot Shells..... 15¢/33¢
 Brass Shot Shells, 1st quality..... 60¢/25¢
 Brass Shot Shells, Club, Rival, Climax..... 65¢/25¢

Shells, Loaded—

Standard List, July 19, 1890..... 40¢/10¢/10¢/40¢/10¢/10¢/55¢

Ship Tools—

L. & I. J. White..... 20¢/25¢

Shoes, Horse, Mule, &c.—

Burden's, Perkins', Phoenix, Standard, Diamond State, Bryden's Boss and Crescent, at factory..... \$4.00
 Bryden's Frog Pressure, at factory..... \$4.00

Mule—**Add \$1 per keg to above prices.****Ox Wrought—**

Ton lots..... \$1.00/\$1.00/\$1.00/\$1.00/\$1.00/\$1.00
 1000 lb lots..... \$1.00/\$1.00/\$1.00/\$1.00/\$1.00/\$1.00
 500 lb lots..... \$1.00/\$1.00/\$1.00/\$1.00/\$1.00/\$1.00

Shot—

Drop, up to B, 25-m bag..... \$1.45
 Drop, up to B, 5-m bag..... 35¢
 Drop, B and larger, 25-m bag..... 1.70
 Drop, B and larger, 5-m bag..... 40¢
 Buck and Chilled, 25-m bag..... 1.70
 Buck and Chilled, 5-m bag..... 40¢
 Dust Shot, 25-m bag..... 2.00
 Dust Shot, 5-m bag..... 45¢

Shovels and Spades—

Ames' Shovels, Spades, &c., list Nov. 1, 1885..... 30¢
 NOTE.—Jobbers frequently give 6¢/7¢ extra on above.
 Griffith's Black Iron..... 50¢/10¢
 Griffith's C. S..... 60¢/80¢/10¢
 Griffith's Solid C. S. R. R. Goods..... 20¢
 St. Louis Shovel Co..... 20¢/20¢/75¢
 Hussey, Biens & Co..... 15¢/25¢
 Hubbard & Co..... 20¢/20¢/75¢
 Lehigh Mfg. Co..... 50¢/10¢
 H. M. Myers Co..... 30¢
 Payne Petebone & Son..... 33¢/45¢
 Remington's (Lowman's) Pat..... 40¢/10¢/50¢
 Rowland's Black Iron..... 50¢/10¢/50¢/10¢/55¢
 Rowland's Steel..... 60¢/50¢/60¢/10¢<

Snaps, Harness, &c.

Anchor (T. & S. Mfg. Co.)	50¢
Fitch's (Bristol)	50¢
Hotchkiss	10¢
Andrews	10¢
Sargent & Greenleaf	70¢
German, new list	40¢
Cover	50¢
Cover, New Patent	50¢
Cover, New R. E.	50¢
Covered Spring	50¢
Cover's Saddlery Works' Triumphant	35¢
John Frost Snaps	75¢
Kelley & Woolworth's Steel Harness	50¢

Snaths

Scythe	50¢
--------	-----

Soldering IronsSee *irons, Soldering.***Spittoons, Cuspidors, &c.****Standard Fiberware**

Cuspidors, 8 1/2-inch, # doz., No. 5, \$8; No. 5, \$8	50¢
Spittoons, Daisy, 8-inch, No. 1, 4; 10 and 11 inch, \$8	50¢

Spoke ShavesSee *Shaves, Spoke.***Spoke Trimmers**See *Trimmers, Spoke.***Spoons and Forks****Tinned Iron**

Basting, Cen. Stamp. Co.'s list	70¢
Best Table and Tea, Cen. Stamp. Co.'s list	70¢
Buffalo, S. S. & Co.	35¢

Silver Plated

4 months or 5¢ cash 30 days:	
Meriden Brit. Co., Rogers	40¢
C. Rogers & Bros.	40¢
Rogers & Bros.	40¢
Reed & Barton	40¢
Wm. Rogers Mfg. Co.	40¢
Simpson, Hall, Miller & Co.	40¢
Holmes & Edwards Silver Co.	40¢
L. Boardman & Son	50¢

Miscellaneous

Holmes & Edwards Silver Co.	50¢
No. 67 Mexican Silver	50¢
No. 30 Silver Metal	50¢
No. 24 German Silver	50¢
No. 50 Nickel Silver	50¢
No. 49 Nickel Silver	50¢
Wm. Rogers Mfg. Co.	50¢
Rogers' Silver Metal	50¢
18¢ Rogers' German Silver	60¢
18¢ Rogers' Nickel Silver	60¢
German Silver, Hall & Elton	50¢
Nickel Silver	50¢
Britannia	60¢
Boardman's Nickel Silver, list July 1, 1891	60¢
Boardman's Britannia Spoons, cash	60¢

Spring

Torrey's Rod, 39 in.	12¢
Warner's No. 1, # doz.	15¢
Star (Coll), list April 19, 1886	20¢
Victor (Coll)	20¢
Champion (Coll)	20¢
Gowell's, No. 1, # doz.	15¢
Rubber, complete, # doz.	45¢
Hercules	50¢
Phoenix	35¢

Carriage, Wagon, &c.

Elliptic, Concord, Platform and Half	60¢
Cliff's Bolster Springs	25¢

Squares

Steel and Iron	80¢
Nickel-Plated	80¢
Try Square and T Bevels	60¢
Diamond's Try Square and T Bevels	50¢
Winterbottom's Try and Miter	30¢
Starrett's Micrometer Calliper Squares	25¢
Avery's Finest Bevel Squares	40¢
Avery's Bevel Protractor	50¢

Squeezers

Fodder	50¢
Blair's "Climax"	50¢

Lemon

Wood, No. 2	30¢
Wood, Common	30¢
Dunlap's Improved	30¢
Hammill's	30¢
Jennings' Star	30¢
The Boss	30¢
Dean's, Nos. 1, # doz.	30¢
Little Giant	30¢
Hotchkiss Straight Flash	30¢
silver & Co., Glass	30¢

Standard Fiber WareSee *Ware, Standard Fiber.***Staples**

Barbed Blind, 1/2 in. and larger	7¢
Barbed Blind, 1/2 in.	8¢
Fence Staples, Galvanized	5¢
Fence Staples Plain	5¢
Grand Crossing Tack Co.'s list	75¢

Steelyards**Stocks and Dies**

Blacksmith's:	
Waterford Goods	35¢
Butterfield's Goods	35¢
Lighting Screw Plate	25¢
Beeco's New Screw Plates	25¢
Reversible Ratchet	25¢
Gardner	25¢
Green River	25¢

Stops, Bench

McGill's, # doz. No. 1, #10.00; No. 2, #1.00	10¢
Hotchkiss's	50¢
Wentworth's, No. 1	50¢

McGill's, # doz. \$3.

Cincinnati	25¢
Terrill's Nos. 1 and 2, # doz.	30¢
Millers Falls	25¢
Stearns	20¢

Stone**Stones, Grind-See Grindstones.****Scythe Stones****Pike Mfg. Co., list April, 1892.****Cleveland Stone Co., list Nov. 1892.****Oil Stones, &c.****Pike Mfg. Co.****Hindostan No. 1, # doz.****Sand Stone****Turkey Oil Stone, 4 to 8****Turkey Slips****Lilly White Washita****Rosy Red Washita****Washita Stone, Extra****Washita Stone, No. 1****Washita Stone, No. 2****Lilly White Slips****Rosy Red Slips****Washita Slips, Extra****Washita Slips, No. 1****Arkansas Stone, No. 1, 3 to 5****Arkansas Stone, No. 1 1/2 to 3 in.****Lake Superior****Lake Superior Slips****Stove Polish****Stretchers Carpet****Cast Iron, Steel Points****Socket****Ballard's****Strops, Razor****Genuine Emerson****Imitation****Torrey's****Sargers' Belt and Com.****Lamont Combination****Jordan's Pat. Padded, list Nov. 1, '89****Electric Cutlery Co.****Campbell Cutlery Co.****Stuffer, Sausage****Miles' Challenge, # doz.****Perry, # doz.****Draw Cut No. 4, each \$30.00****Enterprise Mfg. Co., list Jan 17, '92****Sweepers, Carpet and Lawn Carpet****Bissell No. 5****Bissell No. 8****Bissell, Grand****Standard****Domestic****Domestic, No. 2****Grand Rapids****Crown Jewel, No. 1, \$18.00; No. 2, \$19.00; No. 3, \$20.00****Improved Parlor Queen****Nickel****Excelsior****Garland****Parlor Queen****Housewife's Delight****Ladies' Friend****Ladies' Friend No. 2****Advance****Our Leader****Triumph****Goshen****Supreme****Easy****Gilt Edge****Imperial****Grand Republic****Banner****The Star****Reliable****The Rapid****Model****Goshen Sweeper Company, Grand Rapids, Mich., make the following rebates:****5 dozen in 6 months****10 dozen in 6 months****25 dozen in 6 months****Except on L.F., when 10 dozen price is \$18.50, and 25 dozen \$13.00.****Lawn****Thompson Mfg. Co.****Swings****Davies Lawn****Tacks, Brads &c.****List October 19, 1889. Old established****straight weights. Short Weight goods****are sold at lower prices.****Carpet Tacks****American, Blued****American, Tin'd and Cop'd****Steel, Bright and Blued****Steel, Tinned and Copper'd****Swedes Iron, Blued****Swedes Iron, Tinned****American Iron Tacks, Domestic****Swedes Iron Tacks****S. S., Blued****S. S., Tinned****Lanc., Blued****Lanc., Tinned****Gimp and Lace Tacks****S. S., Blued****S. S., Tinned****Lanc., Blued****Lanc., Tinned****Basket and Trimmers' Tacks****Lanc.****S. S.****Hungarian Nails****Common and Patent Brads****Clashed Tacks****Brush Tacks, S. S.****Looking Glass Tacks, S. S.****Picture-Frame Points, S. S.****Finishing Nails****Trunk and Clout Nails****Black****Tinned or Copper'd****Basket Nails****Chair Nails****Cigar Box Nails****Tin Cap'd Nails****Miscellaneous****Double Point****Wire Carpet Nails****Claw and Flange Carpet****Bonnie Blue****Bill Nye Brad Box****Parlan Gilt Nails****Home Tacks, No. 50 # case (12 cap)****Home Tacks, No. 100, # case (12 cap)****Home Tacks, No. 200, # case (12 cap)****Home Tacks, No. 400, # case (12 cap)****Upholsterers' Nails****Wire Brads and Nails****Steel-Wire Brads, R. & E. Mfg. Co.'s list****See also Nails, Wire.****Tanks, Oil****Emerald, S. S. & Co.: 80-gal. \$8.75; 60-gal., \$11 each****Tapes, Measuring****American****Spring****Chesterman's, Regular list****Thermometers****Tin Case****Thimble Skins-See Skins****Ties, Bale-Steel****Standard Wire, list****Tinners' Shears, &c.****See Shears, Tinners' &c.****Tinware****Stamped, Japanned and Piced, list Jan 20, 1887****Tire Benders, Upsetters, &c.-See Benders and Upsetters, Tire.****Tobacco Cutters****See Cutters, Tobacco.****Tools-Coopers'****Bradley's****Barton's****L. & J. White****Albertson Mfg. Co.****Beatty's****Sandusky Tool Co.****Shaves Cincinnati Tool Co.****Lumber****Ring Peavies, "Blue Line"****Ring Peavies, Common****Steel Socket Peavies****Mall, Iron Socket Peavies****Can Hooks, "Blue Line"****Can Hooks, Common Finish****Can Hooks, Mall, Socket Clasp, "Blue Line"****Can Hooks, Mall, Socket Clasp, Common****Can Hooks, Clip Clasp, "Blue Line"****Can Hooks, Clip Clasp, Common****Hand Spikes****Pike Poles, Pike & Hook****11 ft., \$11.50; 14 ft., \$12.50; 16 ft., \$14.50; 18 ft., \$17.50; 20 ft., \$21.50****Pike Poles, Pike only****10 ft., \$10.00; 14 ft., \$11.00; 16 ft., \$13.00; 18 ft., \$15.00; 20 ft., \$20.00****Pike Poles, not ironed****10 ft., \$7.00; 14 ft., \$9.00; 16 ft., \$11.00; 18 ft., \$13.00; 20 ft., \$16.00****Setting Poles****10 ft., \$15.00; 16 ft., \$17.00****Swamp Hooks****Saw****Atkins, new list****Transom Lifters****See Lifters, Transom.****Traps-Game****Newhouse****Oncida Pattern****Game, Blake's Patent**

Whips

American Whip Co.: Length.	4 1/2	5	5 1/2	6	6 1/2	7	7 1/2	8 ft.
X. L. Whalebone Driving	\$18.00	20.00	22.00	24.00	27.00	30.00	33.00	36.00
Bureka, Two-thirds Whalebone	15.00	16.50	18.00	20.00				
Bull Bone, Half-length Whalebone								
American Standard	8.00	8.50	9.50	10.50	12.00	13.50	15.00	16.50
True Grip, Raw Hide Center	8.00	8.00	8.50	7.00	7.50	9.00		
New Name, Stocked Java, Black and Wine Colors								
American, 93 Pen Whip				8.00				
Gents' Light Driving No. 111				8.00				
Gents' Light Driving No. 106				5.00				
Hand-made Stocked Java No. 108				3.75	4.00			
A large variety of cheaper grades								
Team Whips								
Toy Whips								
Hardware Assortment, 10/American, 75 Whips for \$50.00.								

Wire and Wire Goods—**Iron—****Market,**

Br. & Ann., Nos. 0 to 18.	75¢ to 10¢
Cop'd, Nos. 0 to 18.	75¢ to 10¢
Galv., Nos. 0 to 18.	75¢ to 10¢
Tin'd, Tin'd list, Nos. 0 to 18.	70¢ to 10¢

Extra 5¢ to 10¢ often given and net prices often made on large lots.

Stone, Br. and Ann'd, Nos. 16 to 18.	80¢
Bright and Ann'd, Nos. 19 to 26.	80¢ to 85¢
Br. and Ann'd, Nos. 27 to 30.	85¢ to 10¢
Tinned	65¢ to 10¢
Tinned Broom Wire, 18 to 21.	75¢ to 10¢
Galvanized Fence	75¢ to 10¢
Brass, list Jan. 18, 1884.	40¢ to 50¢
Copper, list Jan. 18, 1884.	40¢ to 50¢
Annealed Wire on Spools.	60¢ to 65¢
Malin's Brass and Cop. on Spools.	50¢ to 55¢

Per dozen.

Ossawan Mills, An'd and Tinned on Spools	60¢ to 10¢
Ossawan Mills, Brass and Copper on Spools	50¢ to 10¢
Tate's Spooled, Tin'd & Annealed	80¢ to 85¢
Tate's Spooled Cop. and Brass	50¢
Cast Steel Wire	50¢
Stub's Steel Wire	\$6.00 to 2, 30¢
Steel Music Wire, 12 to 30, imported	60¢ to 70¢

Wire Clothes Line, see Lines.

Wire Picture Cord, see Cord.

Bright Wire Goods—

Standard list.....85¢ to 85¢ to 10¢

Wire Cloth and Netting—

Painted Screen Cloth 100 ft. \$1.75 to \$2.00

Galvanized Wire Netting.....75¢ to 75¢ to 10¢

Wire Barb—

See Trade Report.

Wire Rope—See Rope, Wire.**Wrenches—**

American Adjustable.....40¢

Baxter's Adjustable "S".....40¢ to 50¢

Baxter's Diagonal.....50¢ to 50¢ to 10¢

Coe's "Mechanics".....50¢ to 50¢ to 10¢

Girard Standard.....65¢ to 10¢ to 70¢

Lamson & Sessions' Engineers'.....60¢ to 10¢

Lamson & Sessions' Standard.....70¢ to 10¢

P. S. & W. Agricultural.....75¢ to 10¢ to 80¢

Lamson & Sessions' Agric'l.....75¢ to 10¢ to 80¢

W. & B. Diamond.....

Bemis & Call's:	
Pat. Combination Bright	40¢ to 50¢
Pat. Combination Black	40 & 10¢
Merrick's Pattern	45¢
Brigg's Pattern	30¢ to 10¢
Cylinder or Gas Pipe	45¢ to 50¢
No. 3 Pipe	50¢
Alken's Pocket (Bright)	\$6.00, 50¢ to 10¢
The Favorite Pocket	\$4.00, 40¢
Leubers' Pat. Combination	50¢ to 50¢
Boardman's	35¢ to 50¢
Always Ready	35¢ to 50¢
Alligator	50¢
Donohue's Engineer	30¢ to 10¢
Eagle	50¢ to 10¢
Acme, Bright	50¢ to 50¢
Acme, Nickel	70¢ to 70¢ to 50¢
Walker's	55¢ to 50¢
Diamond Steel	55¢ to 50¢
Cincinnati Brace Wrenches	25¢ to 10¢
Taft's Vice Wrench	55¢ to 10¢ to 20¢

Wringers, Clothes—

Am. Wringer Co.'s list, Jan. 2, '93.	25¢ cash
Colby Wringer Co., list Sept. 1, '91.	25¢ cash
Lovell Mfg. Co., list Jan. 1, 1892.	25¢ cash
Peerless Mfg. Co., list Feb. 1, 1892.	25¢ cash
National Wringer & Mfg. Co., list June 1, 1892.	25¢ cash

Wrought Goods—

Staples, Hooks, &c., list March 17, 1892.	85¢ to 10¢ to 35¢ to 10¢
---	--------------------------

Paints, Oils and Colors.—Wholesale Prices.

Animal and Vegetable Oils—

Linseed, City, raw, per gal.	50
Linseed, City, boiled	53
Linseed, Western, raw	48
Lard, City, Extra Winter	74
Lard, City Prime	74
Lard, City, Extra No. 1	65
Lard, City, No. 1	55
Lard, Western, prime	73
Cotton-seed, Crude, prime	37
Cotton-seed, Crude, off grades	34
Cotton-seed, Summer Yellow, prime	42
Cotton-seed, Summer Yellow, off grades	40
Sperm, Crude	85
Sperm, Natural Spring	85
Sperm, Bleached Spring	85
Sperm, Natural Winter	1.00
Sperm, Bleached Winter	1.05
Whale, Crude	55
Whale, Natural Winter	55
Whale, Bleached Winter	59
Whale, Extra Bleached	59
Sea Elephant, Bleached	59
Menhaden, Crude, Sound	40
Menhaden, Crude, Southern	40
Menhaden, Light Pressed	42
Menhaden, Bleached W'ter	45
Menhaden, Extra Bleached	48
Tallow, City, prime	60
Tallow, Western, prime	60
Cocconut, Ceylon	6
Cocconut, Cochiti	6
Cod, Foreign	38
Cod, Foreign	42
Red Elaine	44
Red Saponified	54
Bank	40
Straits	41
Oliver, Italian, bbls.	58
Neatsfoot, prime	75
Palm, prime, Lagos	74

Mineral Oils—

Black, 29 gravity, 25 gal cold test	7
Black, 29 gravity, 15 cold test	7
Black, 29 gravity, summer	6
Cylinder, light, filtered	14

Cylinder, dark, filtered	10
Paraffine, 23 1/2 @ 24 gravity	11
Paraffine, 25 gravity	11
Paraffine, 28 gravity	7
Paraffine, red	9

Paints and Colors—

Barytes, Foreign, 10 ton	\$22.00
Barytes, Amer. floated	\$29.00
Barytes, Amer. No. 1	\$16.00
Barytes, Amer. No. 2	\$13.00
Barytes, Amer. No. 3	\$11.00
Blue, Celestial	6
Blue, Chinese	40
Blue, Prussian	25
Blue, Ultramarine	8
Brown, Spanish	3
Brown, Vandyke, Amer.	3
Brown, Vandyke, English	2.75
Carmine, No. 40, in bulk	2.75
Carmine, No. 40, in boxes or barrels	2.85
Carmine, No. 40, in ounce bottles	3.75
Chalk, in bulk	2.40
Chalk, in bbls., 100 lb.	35
China Clay, English	13.00
Cobalt Oxide, prep'd	9.00
Cobalt Oxide, black	1.90
Cobalt Oxide, black, less 100 lb.	1.90
Green, Paris, 170 @ 175 lb.	10
Green, Paris, small pack	12
Green, Chrome, ordinary	6
Green, Chrome, pure	22
Lead, Eng., B.B. white	8
Lead, Amer. White, dry or in oil	7
Kegs, lots less than 500 lb.	6 1/2
Kegs, lots 500 lb to 5 tons	6 1/2
Kegs, lots 5 tons to 12 tons	6 1/2
Kegs, lots 12 tons and over	6 1/2
Lead, White, in oil, 25 lb tin	1
Lead, White, in oil, 12 1/2 lb tin	1
Lead, White, add to keg price	1
Lead, White, in oil, 1 to 5 lb assorted tins, add to keg price	1
Lead, Red, bbls. and 1/2 bbls.	6
Lead, Red, kegs	6 1/2
Litharge, kegs	6 1/2
Litharge, bbls. and 1/2 bbls.	6

TERMS, &c.—Lead and Litharge.—On lots of 500 lb or over, 60 days' time or 2 1/2 % discount for cash if paid within 15 days of date of invoice.

Ocher, Rochelle	1.35
Ocher, French Washed	1 1/2
Ocher, German Washed	1 1/2
Ocher, American	1 1/2
Orange Mineral, English	8 1/2
Orange Mineral, French	10
Orange Mineral, German	8 1/2
Orange Mineral, American	8 1/2
Paris White, English Cliff stone	1.00
Paris White, American	65
Red, Indian, English	5 1/2
Red, Indian, American	2
Red, Turkey	9
Red, Tuscan	9
Red, Venetian, American	100 lb. 1.00
Red, Venetian, English	1.20
Sienna, Italian, Burnt and Powder	4
Sienna, Ital., Burnt Lump	1 1/2
Sienna, Ital., Raw, Powder	4 1/2
Sienna, Ital., Raw, Lump	1 1/2
Sienna, American, Raw	1 1/2
Sienna, American, Burnt and Powdered	1 1/2
Talc, French	1 1/2
Talc, American	1 1/2
Terra Alba, "ch", 100 lb	95
Terra Alba, English	70
Terra Alba, American No. 1	65
Terra Alba, American No. 2	45
Umber, Turkey, Burnt and Powdered	3 1/2
Umber, Turkey, Raw and Powdered	3 1/2
Umber, Turkey, R'w Lump	2 1/2
Umber, Turkey, R'w Amer.	1 1/2
Yellow, Chrome	10
Vermilion, American Lead	11 1/2
Vermilion, Quicksilver, bulk	57
Vermilion, Quicksilver, bags	58
Vermilion, Quicksilver sm't	62
Vermilion, English Import	85
Vermilion, Imitation, Eng.	8
Vermilion, Trieste	90
Vermilion, Chinese	92 1/2
Whiting common, 100 lb	37 1/2
Whiting Gliders	45

THE IRON AGE.

The oldest paper in the world devoted to the interests of the Hardware, Iron and Metal Trades, and a standard authority on all matters relating to those branches of industry.

RATES OF SUBSCRIPTION:

INCLUDING POSTAGE.

UNITED STATES AND BRITISH AMERICA.

Weekly Edition, Issued every THURSDAY MORNING, \$4.50 a year.

Semi-Monthly Edition, First and Third THURSDAYS of every month, 2.30 "

Monthly Edition First THURSDAY of every month, 1.15 "

ALL OTHER COUNTRIES.

Per Annum, Postpaid.

Weekly Edition: \$5.00 = £1 = 25 francs = 20 marks = 11 florins = 6 roubles (coin) = 25 lire = 20 pesetas.

Semi-Monthly Edition: \$2.50 = £10 = 12 1/2 francs = 10 marks = 6 florins = 3 roubles (coin) = 12 1/2 lire = 10 pesetas.

Monthly Edition: \$1.25 = £5 = 6 1/4 francs = 5 marks = 3 florins = 1 1/2 roubles (coin) = 6 1/4 lire = 5 pesetas.

RATES OF ADVERTISING:

ONE SQUARE (12 LINES, ONE INCH).

ONE INSERTION - - - - - \$2.00

ONE MONTH, - - - - - 7.50

THREE MONTHS, - - - - - 17.50

SIX MONTHS, - - - - - \$30.00

ONE YEAR, - - - - - 50.00

Rates for larger spaces quoted on application.

New York (Main Office), - - - - - 96-102 Reade Street,

Philadelphia, - - - - - 220 South Fourth Street,

Pittsburgh, - - - - - Room 509, Hamilton Building.

Chicago, - - - - - 59 Dearborn Street, cor. Randolph,

Cincinnati, - - - - - Rooms 22-24 Pickering Building,

St. Louis, - - - - - Bank of Commerce Building,

Boston, - - - - - 146 Franklin Street,

Cleveland, - - - - - 312 The Cuyahoga,

DAVID WILLIAMS, Publisher

THOMAS HOBSON, Manager.

ROBERT A. WALKER, Manager.

J. K. HANES, Business Manager.

GEO. W. COPE, Resident Asso. Ed.

HENRY SMITH, Manager.

H. H. ROBERTS, Manager.

WALTER C. ENGLISH, Manager.

EZRA S. ADAMS, Manager.

BRITISH AGENCY: Office of The Ironmonger, 42 Cannon St., London.

Remittances should be made by draft, payable to the order of DAVID WILLIAMS, on any banking house in the United States or Europe, or by P. O. Money Order on New York. When these cannot be obtained, postage stamps of any country will be received.

Newsdealers or Booksellers in any part of the world may obtain The Iron Age through The American News Company, New York, U. S. A. The International News Company, New York, U. S. A., and London, England; or The San Francisco News Company, San Francisco, Cal., U. S. A.

Entered at the Post Office, New York, as Second-Class Matter.

JULY 12, 1893.

Hosted by Google

This is a reproduction of a library book that was digitized by Google as part of an ongoing effort to preserve the information in books and make it universally accessible.

GoogleTM books

<https://books.google.com>

